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ABSTRACT

Developed as part of the Marine Corps Institute (MCI) correspondence training program, this course on warehousing operations is designed to provide instruction in the procedures used in warehousing operations. Introductory materials include specific information for MCI students and a study guide (guidelines to complete the course). The 22-hour course consists of six chapters or lessons. Each unit contains a text and a lesson sheet which details the study assignment and sets forth the lesson objective. A written assignment is also provided. Topics covered in the lessons include an introduction; storage space (layout, space requirements, and space control and reporting); handling operations; storage procedures (receiving, inventory policy and procedures, care of material in storage, shipping operations); storage of special commodities (lumber, ammunition and explosives, storage of hazardous commodities, miscellaneous commodities, subsistence); and preservation, packaging, and packing. Appendixes include six explanations of various codes. (YLB)

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MARINE CORPS INSTITUTE, MARINE BARRACKS
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ARLINGTON, VA. 22222

30.3h
28 Feb 1984

1. ORIGIN

MCI course 30.3h, Warehousing Operations, has been prepared by the Marine Corps Institute.

2. APPLICABILITY

This course is for instructional purposes only.

H. M. McIlroy Jr

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30.3h

WAREHOUSING OPERATIONS

Course Introduction

WAREHOUSING OPERATIONS is designed to instruct you in the procedures used in warehousing operations. Although the actual skills of effective warehousing must be gained from experience, this course will instruct you in the fundamentals for laying out storage areas, computing storage space and materials handling equipment, storage of various commodities, and the procedures used in preservation, packaging, packing, and marking of military supplies and equipment.

ORDER OF STUDIES

Lesson Number	Study Hours	Reserve Retirement Credits	Subject Matter
1	2	0	Introduction
2	4	2	Storage Space
3	3	1	Materials Handling Operations
4	3	1	Storage Procedures
5	3	1	Storage of Special Commodities
6	4	1	Preservation, Packaging, and Packing
	3	1	FINAL EXAMINATION
	22	7	

EXAMINATION: Supervised final examination without textbooks or notes; time limit, 3 hours.

MATERIALS: MCI 30.3h, Warehousing Operations.

Lesson sheets and answer sheets.

RETURN OF MATERIALS: Students who sucessfully complete this course are permitted to keep the course materials.

Students disenrolled for inactivity or at the request of their commanding officer will return all course materials.

SOURCE MATERIALS

MCO P4450.7D	Marine Corps Warehousing Manual, Oct 1979 (w/ch 3)
MCO P4400.75C	Mechanization of Warehousing and Shipment Processing (MOWASP) Manual, SEP 81
MCO P4030.21C	Preservation of Material (Vol. II) Packing (W/Ch 1) OCT 80
MCO P4400.76A	Direct Support Stock Control (DSSC) Manual, Apr 1971 (w/ch 6)
MCO P4030.31C	Packaging of Material (Vol. I) Preservation AUG 82
MCO P4030.36	Marine Corps Packaging Manual, Apr 1982
MCO P4400.151	Intermediate Level Supply Management Policy Manual, Aug 1982
MCO P4400.123B	FMF Sassy Accounting Manual, Vol II, SMU Procedures, Jun 1976 (w/ch 3)
DoD 4145.19-R-1	Storage and Materials Handling, Sep 1979
MIL-STD-129H	Military Standard Marking for Shipment and Storage, Jan 1982
MIL-P-116H	Methods of Preservation, Dec 1980
NAVSUPINST 4450.22	Supply Facility Management Reporting, Requirements Planning and Acquisition Justification System, Nov 1974 (w/ch 2)

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INFORMATION

FOR

MCI STUDENTS

Welcome to the Marine Corps Institute training program. Your interest in self-improvement and increased professional competence is noteworthy.

Information is provided below to assist you in completing the course. Please read this guidance before proceeding with your studies.

1. MATERIALS

Check your course materials. You should have all the materials listed in the "Course Introduction". In addition you should have enough envelopes to mail all lessons back to MCI unless your lesson answer sheets are of the self-mailing type. If your answer sheets are of the pre-printed type, check to see that your name, rank, and social security number are correct. Check closely, your MCI records are kept on a computer and any discrepancy in the above information may cause your subsequent activity to go unrecorded. You may correct the information directly on the answer sheet. If you find a discrepancy and correct it, ensure you correct this information on all your answer sheets. If you did not receive all your materials, use the enclosed Student Request/Inquiry (MCI-R14_) to notify MCI of this fact and what you require. (Note: The MCI-R14_ may be mailed to MCI without envelope or stamp.

2. LESSON SUBMISSION

It is most important that you complete the required information at the top of each answer sheet that does not have your name and address pre-printed on it. In courses in which the work is submitted on blank paper or printed forms, identify each sheet in the following manner:

DOE, John J. Sgt 332-11-9999
08.4g, Forward Observation
Lesson 3
Military or office address
(RUC number, if available)

Submit your lessons on the answer sheets provided. Complete all blocks and follow directions on the answer sheet for mailing. Otherwise, your answer sheet may be delayed or lost. If you have to interrupt your studies for any reason, you may request a single six month extension of time by contacting your training NCO. If you are not attached to a Marine Corps unit you may make this request by submitting the enclosed MCI-R14_. You

are allowed one year from the date of enrollment to complete this course. Your commanding officer is notified of your status through the monthly Unit Activity Report. In the event of difficulty, contact your training NCO or MCI immediately.

3. MAIL-TIME DELAY

Presented below are the mail-time delays that you may experience between the mailing of a lesson and its return to you.

	TURNAROUND MAIL TIME	MCI PROCESSING TIME	TOTAL NUMBER DAYS
EAST COAST	10	5	15
MIDWEST	12	5	17
WEST COAST	16	5	21
OVERSEAS	24	5	29

You may also experience a short delay in receiving your graded last lesson and your final examination due to administrative screening required at MCI.

4. GRADING SYSTEM

LESSONS			EXAMS	
GRADE	PERCENT	MEANING	GRADE	PERCENT
A	94-100	EXCELLENT	A	94-100
B	86-93	ABOVE AVERAGE	B	86-93
C	78-85	AVERAGE	C	78-85
D	70-77	BELOW AVERAGE	D	65-77
NL	BELOW 70	FAILING	F	BELOW 65

You will receive a percentage grade for your lessons and for the final examination. All lessons must be COMPLETED AND PASSED before you will be administered an exam. The grade attained on the final exam is your course grade.

5. FINAL EXAMINATION

ACTIVE DUTY PERSONNEL: When you submit your LAST LESSON, your exam will be mailed automatically to your commanding officer. The administration of MCI final examinations must be supervised by a commissioned or warrant officer, or a staff NCO (equivalent or higher).

INACTIVE DUTY OR CIVILIAN EMPLOYEE: The exam may be supervised by a director of civilian personnel, civilian training officer, clergyman, or local school official.

6. COMPLETION CERTIFICATE

The completion certificate will be mailed to your commanding officer. For non-Marines, it is mailed to your supervisor.

7. RESERVE RETIREMENT CREDITS

Reserve retirement credits are awarded to inactive duty personnel only. Credits awarded for each course are listed in the "Course Introduction" and are only awarded upon successful completion of the course. Reserve retirement credits are not awarded for MCI study performed during drill periods if credits are also awarded for drill attendance.

8. DISENROLLMENT

Only your commanding officer can request your disenrollment from an MCI course.

9. ASSISTANCE

Consult your training NCO in the event of course content problems. Should he be unable to assist you, MCI is ready to help you whenever you need it. Please use the enclosed Student Course Content Assistance Request (MCI-CP19_) or call the Autovon telephone number listed below for the appropriate course writer section.

PERSONNEL/ADMINISTRATION	288-3259
COMMUNICATIONS/ELECTRONICS/AVIATION	288-3604
INFANTRY	288-3611
ENGINEER/MOTOR TRANSPORT	288-2275
SUPPLY/FOOD SERVICES/FISCAL	288-2285
TANKS/ARTILLERY/INFANTRY WEAPONS REPAIR LOGISTICS/EMBARKATION	288-2290

For administrative problems call the MCI Hotline: 288-4175

For commercial phone lines, use area code 202 and prefix 433 instead of 288.

STUDY GUIDE

10. STUDY HINTS

By enrolling in this course, you have shown a desire to improve the skills you need for effective job performance, and MCI has provided materials to help you achieve your goal. Now all you need is to develop your own method for using these materials to best advantage.

The following guidelines present a four-part approach to completing your MCI course successfully:

- Make a "reconnaissance" of your materials;
- Plan your study time and choose a good study environment;
- Study thoroughly and systematically;
- Prepare for the final exam.

a. MAKE A "RECONNAISSANCE" OF YOUR MATERIALS

Begin with a look at the course introduction page. Read the COURSE INTRODUCTION to get the "big picture" of the course. Then read the MATERIALS section near the bottom of the page to find out which text(s) and study aids you should have received with the course. If any of the listed materials are missing, see paragraph 1 of this pamphlet to find out how to get them. If you have everything that is listed, you are ready to 'reconnoiter' your MCI course.

Read through the table(s) of contents of your text(s). Note the various subjects covered in the course and the order in which they are taught. Leaf through the text(s) and look at the illustrations. Read a few lesson questions to get an idea of the types that are asked. If MCI provides other study aids, such as a slide rule or a plotting board, familiarize yourself with them. Now, get down to specifics!

b. PLAN YOUR STUDY TIME AND CHOOSE A GOOD STUDY ENVIRONMENT

From looking over the course materials, you should have some idea of how much study you will need to complete this course. But "some idea" is not enough. You need to work up a personal study plan; the following steps should give you some help.

① Get a calendar and mark those days of the week when you have time free for study. Two study periods per week, each lasting 1 to 3 hours, are suggested for completing the minimum two lessons required each month by MCI. Of course, work and other schedules are not the same for everyone. The important thing is that you schedule a regular time for study on the same days of each week.

② Read the course introduction page again. The section marked ORDER OF STUDIES tells you the number of lessons in the course and the approximate number of study hours you will need to complete each lesson. Plug these study hours into your schedule. For example, if you set aside two 2-hour study periods each week and the ORDER OF STUDIES estimates 2 study hours for your first lesson, you could easily schedule and complete the first lesson in one study period. On your calendar you would mark "Lesson 1" on the appropriate day. Suppose that the second lesson of your course requires 3 study hours. In that case, you would divide the lesson in half and work on each half during a separate study period. You would mark your calendar accordingly. Indicate on your calendar exactly when you plan to work on each lesson for the entire course. Do not forget to schedule one or two study periods to prepare for the final exam.

③ Stick to your schedule.

Besides planning your study time, you should also choose a study environment that is right for you. Most people need a quiet place for study, like a library or a reading lounge; other people study better where there is background music; still others prefer to study out-of-doors. You must choose your study environment carefully so that it fits your individual needs.

c. STUDY THOROUGHLY AND SYSTEMATICALLY

Armed with a workable schedule and situated in a good study environment, you are now ready to attack your course, lesson by lesson. You will find your first study assignment and your first written assignment on page 1 of lesson 1. On this page you will also find the lesson objective, a statement of what you should be able to do after completing the assignments.

DO NOT begin by reading the lesson questions and flipping through the text for answers. If you do so, you will prepare to fail, not pass, the final exam. Instead, proceed as follows:

① Read the study assignments carefully. Make notes on the ideas you feel are important and mark any portion you have difficulty understanding.

② Reread the portions you marked in step ① When you have mastered the study assignment, start to work on the written assignment.

③ Read each question in the written assignment carefully.

④ Answer all questions that you are sure of and leave the others blank.

⑤ Reread the portions of the study assignment that explain the items you left blank.

⑥ Complete the written assignment and send it to MCI for grading.

⑦ Go on to the next lesson.

Follow the same procedure for each lesson of the course. If you have problems with the text or lesson questions that you cannot solve on your own, ask your section OIC or NCOIC for help. If he cannot aid you, request assistance from MCI on the MCI Student Course Content Assistance Request included in this pamphlet.

When you have passed the final lesson, the final exam will be sent to your training officer or NCO.

d. PREPARE FOR THE FINAL EXAM

How do you prepare for the final exam? Follow these three steps:

① Review each lesson objective as a summary of what was taught in the course.

② Reread all portions of the text that you found particularly difficult.

③ Review all the lesson questions, paying special attention to those you missed the first time around.

If you follow these simple steps, you should do well on the final. GOOD LUCK!

Chapter 1

INTRODUCTION

1-1. CONCEPT OF THE MARINE CORPS UNIFIED MATERIEL MANAGEMENT SYSTEM (MUMMS)

a. General. The Marine Corps Unified Materiel Management System (MUMMS) is an integrated system of centralized supply management. It is designed to meet all internal and external Marine Corps requirements by using modern management and automatic data processing techniques. This supply system operates from a single Inventory Control Point (ICP) and two Marine Corps Logistic Bases (MCLB's). MUMMS is composed of 16 subsystems, which may be added to, revised, combined, or possibly deleted as the system requirements indicate. The adoption of MUMMS brought many changes and added new dimensions to the Marine Corps supply system. Responsiveness is the keynote of the system. This responsiveness is possible through the use of the automatic digital network (AUTODIN) and the centralization of inventory control and stores accounting. Automatic digital network terminals are installed at all Marine Corps activities which have receiver capabilities. The Inventory Control Point is located at the Marine Corps Logistics Base, Albany, Georgia.

b. The Marine Corps distribution system. The Marine Corps distribution system comprises all actions required in the acquisition, availability, and disposal of materiel assets of the Marine Corps. Distribution of supplies is controlled from the time they enter the military supply system until they are issued. Total system responsiveness requires contributions from elements of Headquarters Marine Corps, the ICP, and the Marine Corps Logistic Bases. The MCLB's established under the supply distribution are equipped with computers. The main supply distribution points are:

MCLB, Barstow, Calif.
MCLB, Albany, Ga.

Now let's take a look at the responsibilities of the units that help make the distribution system function.

(1) Inventory Control Point (ICP). The Marine Corps Logistics Base, Albany, Georgia has technical control over all supplies affecting each MCLB. The ICP is the central supply processing point for the Marine Corps supply system. It controls the input, availability, and disposal of materiel. The ICP is responsible for receiving and processing requisitions from customers, providing the MCLB's with copies of contracts and procurement instructions, and with instruction as to the disposition of all requisitions initiated by the customer.

(2) Marine Corps Logistic Base (MCLB). The mission of a MCLB is varied. Their general mission is to receive, store, and issue materiel from the distribution system for the logistical support of the Marine Corps. They also have the additional responsibility of functioning as major maintenance and repair installations. The MCLB determines the requirements, procedures, and decontrolled items as required and performs item accounting for all items procured. At the present time the main distribution points (MCLB's) are operating under subsystem 06 (Mechanization of Warehousing and Shipment Processing, MOWASP). The administrative functions and tasks required in the operation of the distribution system are organized into the 16 subsystems of MUMMS. These subsystems all combine to complete the MUMMS system.

c. Interrelationship. Figure 1-1 shows the interrelationships of MUMMS. The chart indicates the use of the AUTODIN network to keep all units in immediate contact with each other. As figure 1-1 indicates, MUMMS depends on other activities outside the Marine Corps. This is to give you a general setup of the MUMMS concept. Only those subsystems that concern you as a warehouseman will be discussed in this course.

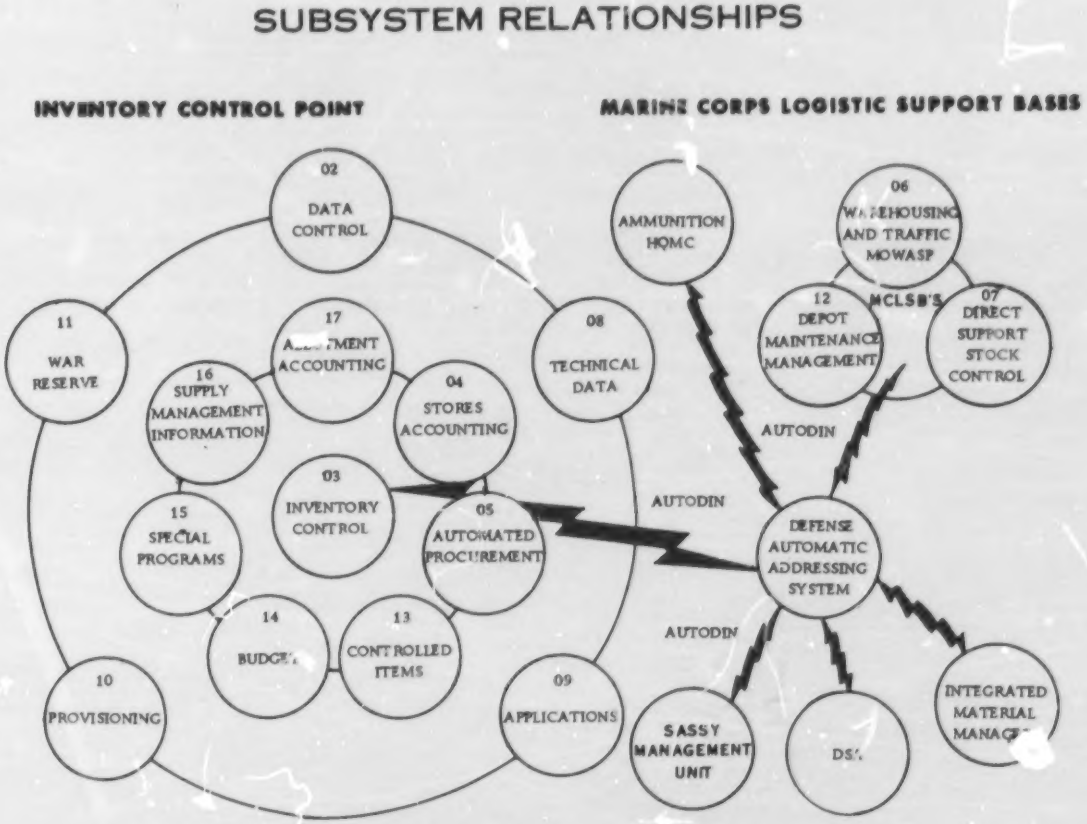


Fig 1-1. MUMMS system interrelationships.

1-2. THE SUPPLY CYCLE

a. Phases of supply. The functions of supply are many and varied. The phases of supply basically work the same for all supply units regardless of size. Before any supply unit can function, it must determine the requirements for supplies, determine the method or means of procuring the supplies, and then accomplish the actual distribution or issue of the items to the people that need them. The functions of supply can be grouped into three broad categories:

(1) Determination of requirements. Of the three supply functions or phases, probably the most important is the determination of requirements, which is the responsibility of the individual commander.

(2) Procurement. Procurement is the actual tool or method by which needed material is obtained. It can be best described as the act of requisitioning, purchasing, renting, leasing, or otherwise obtaining supplies or services.

(3) Distribution. This is the final element of the supply cycle and represents the pipeline leading from the determination of requirements and procurement to the user. It is the issue or sale of supplies to the individual unit concerned that needs the supplies. In addition, distribution includes the receipt of, invoicing of, and accounting for all supplies. In warehousing operations, you are concerned primarily with the distribution phase of the supply cycle because warehousing deals mostly with the process of receiving, storing, handling, and the issuing of the items.

b. Interrelationship. These three phases are not separate one-way streets; rather, they may be considered a 3-lane highway. Determination of requirements, procurement, and distribution are interrelated; lacking either of these functions, there is little justification for the other two. There is very little sense in determining what you need and setting out to procure it if you do not know how to handle it when you receive it. On the other hand, there is no way you can distribute an item to using troops if you do not know how to obtain it. As a warehousemman it is up to you as an individual to become proficient in warehousing so that you will be able plan for storage of items as they come in and to take care of them while in storage. If supplies are kept in good condition in storage, it will be a simple matter to issue and distribute them to the units when they need them.

1-3. SUPPLY AND SUPPORT ORGANIZATIONS

a. Background. This paragraph will acquaint you with those organizations responsible for providing supply and combat support to FMF using units. These organizations are elements of the force service support group, the SASSY management unit of a Marine division, and the Marine wing support group. These FMF service units must be capable of mounting out with their supplies if the units which they support are employed in tactical situations. In addition to FMF units, this paragraph introduces you to the organizational structure of a base materiel battalion and direct support stock control (DSSC) outlets.

a. Force service support groups (FSSG). Their primary mission is to provide sustained logistical support to a division/wing air-ground task force including isolated components. Their mission includes all functions related to requisitioning, accounting, storage, and issue of all classes of supply and all field maintenance of materiel.

c. SASSY management unit (SMU). The SMU has the mission of receipt, storing, maintaining, and issue of supplies to FMF using units for the FSSG. Its mission includes maintaining a centralized mount out for all FMF units. That is, FMF battalions and separate units submit their requisitions to the SMU. The requisition is then either filled, back-ordered, or forwarded to the MCLB or the appropriate integrated materiel manager (IMM) and in turn is shipped directly to the unit.

d. Marine wing support group (MWSG). The MWSG is the largest supply department in the Marine air wing. It is responsible for maintaining a 60-day backup of supplies and equipment to support operating groups in tactical situations. In addition, it provides day-to-day support to the squadrons of the support group itself. Its supply functions are comparable in many respects to those of a SASSY management unit to a Marine division. This similarity exists because the MWSG is also a "middleman" between the ICP and the using units.

e. Support Activities.

(1) Base materiel battalion. The base materiel battalion provides the supply functions, the direct support control, and other functions of supply support necessary at a garrison-type activity. The duties of the various divisions and branches of the base materiel battalion parallel those of like divisions and branches at a Marine Corps Logistic Base.

(2) Direct-support stock control (DSSC). Under the present concept of MUMMS, the DSSC is subsystem 07. It serves the function of a retail outlet for the customer at post and station activities. This subsystem can be compared to a small scale service unit. The operation of each DSSC may vary, but the overall operation remains within the concept of the basic MCO P4400.76_. Materiel positioned within the DSSC belongs to the distribution system, and the ICP accounts for the materiel by money value only. There are several types of customer outlets which make up the DSSC. These outlets are self-service centers, shop stores, clothing sales and issues, and ammunition dumps.

1-4. THE PRIORITY DESIGNATOR SYSTEM

This system insures that the requests for material are processed in accordance with the military importance of the requisitioner and the urgency of need. Within the priority designator system there are 15 distinct priority designators, and preference is given to those of greater military importance. Priority designators 02 and 03 should be used in peacetime only under extreme circumstances. If correctly used by the requisitioning activities and recognized by the warehouseman, these designators will provide a basis for true emergency service. The priority designator system will be explained in a later chapter of this course.

1-5. WAREHOUSE PUBLICATIONS AND DIRECTIVES

One of the continuing problems in the area of supply is knowing where to find the instructions necessary for effective and efficient operations. The purpose of this paragraph is to help you become familiar with the various sources of warehousing procedures taught and referred to in this course. It is necessary for you, in your daily work, to have a knowledge of the publications and directives affecting warehouse operations.

a. Storage and Materials Handling (DOD 4145.19-R-1). This publication is the basic warehousing text for the entire Department of Defense. It has 8 chapters, each divided into sections for a clearer understanding of the materiel involved, and 3 appendices.

b. Mechanization of Warehousing and Shipment Processing Manual (MOWASP) (MCO P4400.75). This manual is one of the family of manuals of the Marine Corps Unified Materiel Management System (MUMMS) and prescribes the standard procedures for processing transactions between the Inventory Control Point (ICP) and the MOWASP subsystem at the Marine Corps Logistic Bases. The procedures contained in this manual are designed to achieve maximum standardization of transaction processing between these activities and to simplify warehousing and shipping operations by eliminating unnecessary manual systems and reports.

c. Preservation, Packaging, and Packing of Military Supplies and Equipment (MCO P4030.21 and MCO P4030.31). These publications were prepared for joint use by all the Armed Forces. Although these publications are not discussed in detail in this course, they should be used as a reference for warehousing operations involving cleaning, drying, protecting, packing, and the like. Military specification, MIL-P-116 , Methods of Preservation, should be consulted in conjunction with MCO P4030.21_ and MCO P4030.31_.

d. Military Standard Marking for Shipment and Storage (MIL-STD-129H). This manual should be consulted to insure proper marking of supplies and equipment to reduce the problems involved in shipment of improperly marked containers. Instructions in this manual will also help eliminate the cost of repacking and remarking of supplies.

e. Marine Corps Warehousing Manual (MCO P4450.7). The instructions in this manual provide guidance and Marine Corps policy and procedures to be followed in establishing, using, expanding, inactivating, and disestablishing storage and warehousing operations. This manual also provides guidance in warehousing and rewarehousing of material within the Marine Corps stores system and the establishment of a standard field warehousing system.

1-6. CLASSES OF SUPPLY

a. Purpose. The primary purpose of the ten classes of supply is to provide an administrative procedure or tool of convenience for identifying and grouping like items into classes which aid in planning, authorizing supply levels, and identifying supply locations. In addition, the grouping provides a common language for reference purposes and exchange of supply information. Classes of supply are not, however, used in the requisitioning of supplies, budget, or inventory management. This widely used system of grouping supplies is the most important for logistical purposes. Read carefully the chart on the next page to get an idea of the present system which is used throughout the Marine Corps.

b. Utilization. The supply class structure is widely used by the Department of the Army. The Air Force does not use classes of supply as such, but makes references to material in such terms as war consumables, war readiness spare kits, and station and housekeeping sets. The Air Force utilizes the supply classes as required in joint operations. The Department of the Navy uses supply commodity grouping in supply operations. Subsistence, POL, and ammunition are regarded as commodities which need no additional identification. During amphibious operations, naval units utilize the classes of supply and refer to them while supporting the Marine Corps units.

c. The 10 classes of supply. The classes of supply listed in figure 1-2 will provide all elements of the DOD a major tool for logistic planning and operations. Through the use of these supply classes, more realistic information and data will be available for use in performing appraisals of logistic problems. These classes of supply permit definite and meaningful expression of authorizations and levels. The 10 classes provide planners at all levels in all services with a uniform system for stating their authorizations and levels. The homogenous grouping of material by distinctive class and subclassification permits realistic planning for movement, receipt, storage, and issue of supplies.

Class I - Subsistence

A - Air (Inflight rations)
C - Combat Rations 3/
R - Refrigerated subsistence
S - Non - refrigerated subsistence (less combat rations)

Class II - Clothing, individual equipment, tentage, organizational tool sets, toolkits, handtools, administrative and housekeeping supplies and equipment.

B - Ground support materiel 2/
E - General supplies
F - Clothing and textiles
M - Weapons
T - Industrial supplies 5/

Class III - POL: Petroleum fuels, lubricants, hydraulic and insulating oils, preservatives, liquid and compressed gasses, bulk chemical products, coolants, de-icing and anti-freeze components and additives of such products, and coal.

A - Air
W - Ground (surface)

Class IV - Construction: Construction material, to include installed equipment and fortification/barrier material.

No subclasses of supply

Class V - Ammunition: Of all types (including chemical, radiological and special weapons), bombs, explosives, mines, fuzes, detonators, pyrotechnics, missiles, rockets, propellants, and other asociated items.

A - Air
W - Ground (surface)

Class VI - Personal demand items. (non-military sales items).

No subclasses of supply

Class VII - Major end items: A final combination of end products which is ready for its intended use; i. e., launchers, tanks, vehicles, mobile machine shops, etc.

A - Air
B - Ground support materiel 2/
D - Administrative vehicles 4/
G - Electronics
K - Tactical vehicles
L - Missiles
M - Weapons
N - Special weapons

Class VIII - Medical materiel, including medical peculiar repair parts.

No subclasses of supply

Class IX - Repair parts (less medical peculiar repair parts): all repair parts and components, including kits, assemblies and subassemblies (reparable and nonreparable) required for maintenance support of all equipment.

A - Air
B - Ground support materiel 2/
D - Administrative vehicles 4/
G - Electronics
K - Tactical vehicles
L - Missiles
M - Weapons
N - Special weapons
T - Industrial supplies 5/

Class X - Materiel to support non-military programs (e.g., agricultural and economic development) not included in classes I - IX.

Note: Major classes are in Roman numerals; subclasses 1/ are in Arabic letters.

(Footnotes are on the next page.)

Fig. 1-2. Ten classes of supply and their subclasses.

1/ The alpha code for the subclassification of classes II, VII, and IX represents, with one exception, materiel category designators used in supply management. The exception is A (air), which is used for all applicable classes. Alpha codes not used as materiel category designators were assigned as subclassifications for classes I, III, and V. An addition subclassification materiel category designator (A through T) could be found in combination with the designated subclassification. For example, class V AL designates "Ammunition, Air, Missile." These subclassifications may be found in use by unified and specified commands or by the other services. The Marine Corps, however, does not intend to use materiel category designator subclassifications with a major classification unless they are specifically linked with one of the other major classifications above. Permissive coding does allow the services to add subclassifications, if they are required, for materiel use only.

2/ Includes power generators, construction, barrier, bridging, firefighting, petroleum and mapping equipment.

3/ Includes gratuitous health and welfare items.

4/ Commercial vehicles used in administrative motor pools.

5/ Includes bearings, block and tackle, cable, chain, wire rope, screws, bolts, studs, steel rods, plates and bars.

Fig. 1-2. Ten classes of supply and their subclasses--cont'd.

WAREHOUSING OPERATIONS

Lesson 1

Introduction

STUDY ASSIGNMENT: Information for MCI Students.
Course Introduction.
MCI 30.3H, Warehousing Operations, chap 1.

LESSON OBJECTIVE: Successful completion of this lesson, combined with on-the-job experience, will enable you to identify the various supply sources, the supply distribution system, sources of warehousing information, and the classes of supply.

WRITTEN ASSIGNMENT:

A. Multiple Choice: Select the ONE answer which BEST completes the statement or answers the question. After the corresponding number on the answer sheet, blacken the appropriate circle.

Value: 1 point each

1. MUMMS is composed of_____subsystems.

   a. 9
   b. 12
   c. 15
   d. 16

2. As a warehouseman, you are primarily concerned with which phase of the supply cycle?

   a. Preservation
   b. Determination of requirements
   c. Procurement
   d. Distribution

3. Which system encompasses all action required for the acquisition, availability, and disposal of materiel assets of the Marine Corps?

   a. MOWASP
   b. Direct support stock control
   c. Distribution
   d. AUTODIN

4. Where is the Inventory Control Point for the Marine Corps located?

   a. MCLB, Albany, Ga.
   b. MCLB, Barstow, Ca.
   c. Headquarters Marine Corps
   d. MCDEC, Quantico, Va.

5. Responsiveness is the keynote to MUMMS and is accomplished through the use of

   a. AUTODIN.
   b. AUTOVON.
   c. the ICP.
   d. the MCLB's.

6. Which organization has an additional responsibility of functioning as a major maintenance and repair facility?

   a. MCDEC, Quantico, Va.
   b. MCB, Camp Lejeune, N. C.
   c. MCB, Camp Pendleton, Calif.
   d. MCLB, Albany, Ga.

7. Which activity has the primary mission of providing sustained logistical support to a division/wing air-ground task force?

a. Force service support group
b. SASSY management unit
c. Base materiel battalion
d. Direct support stock control

8. Which organization has supply functions similar to those of a SASSY management unit?

a. Force service support group
b. Marine Corps Logistic Base
c. Marine wing support group
d. Base materiel battalion

9. What is the primary mission of the SASSY management unit of a Marine division?

a. Combat supply and storage support
b. Receipt, storing, maintaining, and issue of supplies to FMF using units
c. Tactical and logistical support
d. Overhaul, repair, and issue of reparable items

10. Which organization serves as a retail outlet for customers at post and station activities?

a. SASSY management unit
b. Battalion supply
c. Force service support group
d. Direct support stock control

11. To support operating groups in tactical situations the MWSG is responsible for maintaining a _____ backup of supplies and equipment.

a. 50-day
b. 30-day
c. 70-day
d. 60-day

12. How many chapters does DOD 4145.19R-1 contain?

a. 6
b. 5
c. 7
d. 8

13. DOD 4145.19R-1 contains_____appendices.

a. 5
b. 4
c. 3
d. 6

14. Which is one of the two MCO's used for instruction in preservation, packaging, and packing of military supplies and equipment?

a. MCO P4400.76
b. MCO P4400.75
c. MCO P4030.31
d. MCO P4400.15

15. Which joint service publication is the basic warehousing text for the entire Department of Defense?

a. DOD 4145.19-R-1
b. MCO P4400.75
c. NavSandA Manual
d. Armed Services Procurement Regulation

16. Which manual should be used for instruction in marking supplies and equipment for storage and shipment?

a. MCO P4400.75
b. MCO P4400.76
c. ASPR
d. MIL-STD 129

17. Which items are classified as class II supplies?

a. Subsistence
b. Clothing
c. Ammunition
d. Repair parts

18. What type of items should you expect to receive in a shipment of class V supply?

a. Petroleum
b. Subsistence
c. Ammunition
d. Construction material

19. Rations for troops in flight would be classed

a. I-A.
b. I-C.
c. III-A.
d. III-W.

20. Repair parts for tactical vehicles are classed

a. II-M.
b. IX-B.
c. IX-K.
d. X.

21. What type of items would you receive in a shipment of class I-C supplies?

a. Air (inflight) rations
b. Refrigerated subsistence
c. Nonrefrigerated subsistence
d. Combat rations

Note: Questions 22 to 29 require you to identify the class (a-e below) to which each supply item belongs.

22. Combat rations
23. Tentage
24. Handtools
25. Lubricants
26. Chemical ammunition
27. Compressed gases
28. Medical material
29. Organizational tool kits

a. Class I
b. Class II
c. Class III
d. Class V
e. Class VIII

Total Points: 29

* * *

Chapter 2

STORAGE SPACE

Section I. THE STORAGE LAYOUT

2-1. INTRODUCTION

There are two basic types of storage facilities; covered storage space and open storage space. Covered storage space is storage space within any roofed structure. Within this category are a variety of structure types. These are:

General-Purpose Warehouse	Transitory Shelter
Controlled Humidity Warehouse	Above Ground Magazine
Refrigerated Warehouse	Earth Covered Magazine
Flammable Storage Warehouse	Dry Tank
Shed	

Open storage space is an improved or unimproved open area designated for storage purposes. The open improved storage space is an area which has been graded and surfaced with concrete, tar or asphalt, crushed stone or gravel, or other suitable topping. The unimproved storage space is a designated area for storage which is unsurfaced.

No matter which type of storage facility that is used, efficient operations depend mostly upon the fullest use of space with minimum operating cost for materials handling and other procedures for the storage of material. This can be obtained only by planning of storage space.

2-2. FACTORS OF LAYOUT

a. Similarity. Primarily, items are stored by class; within classes, items may be stored by category to make storage and issue easier. The first use of storage space for specific items will be by class grouping. Example: As far as possible, all items in class 2530 will be stored in one area.

b. Popularity. Activity or turnover is the first factor to be considered in determining storage location for material. Stocks that move daily should be stored nearest the shipping area, as should the bin stocks. Items with the slowest movement should be located farthest from the working area. Figure 2-1 illustrates the proper storage layout by popularity.

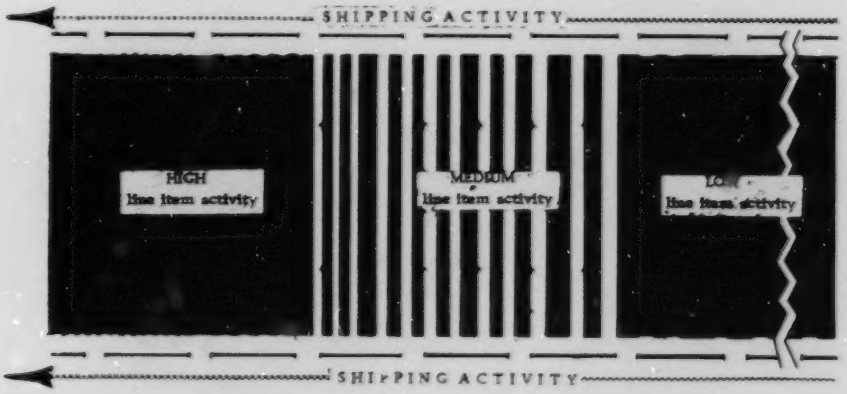


Fig 2-1. Storage of stocks by popularity.

c. Size. The ever-changing level of quantities on hand makes it essential that storage be by cubic size rather than numerical sequence. The size of an individual item affects not only the amount of storage space which will be allotted to a class but will also be considered in the location of that class within the storage area. The size of an item will determine the type of storage aid required for its storage. Within the various activity areas for fast, medium, and slow-moving stock, provisions must be made to store items of different cubic size.

d. Characteristics. No special handling or storage methods are required for most items of general supply; only if their similarity, popularity, or size must be considered will they require special handling or storage. However, there are some items which do require special handling. Consideration must be given to the special handling and storage of all such materials in planning the layout of storage areas. Figures 2-2 and 2-3 illustrate two sample layouts for storage that can be used. It is up to you as the warehouseman to determine how you can best utilize the storage layout in accordance with similarity, popularity, size, and other characteristics.

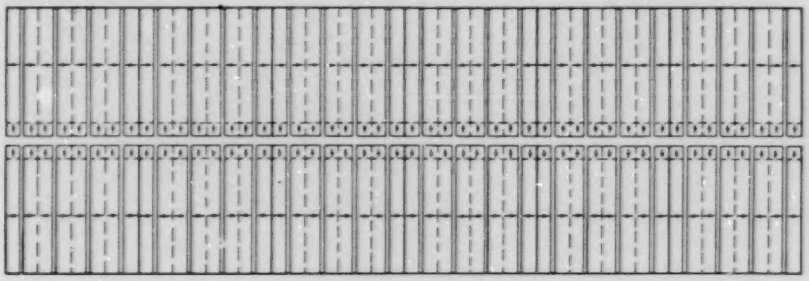


Fig 2-2. Sample shed layout.

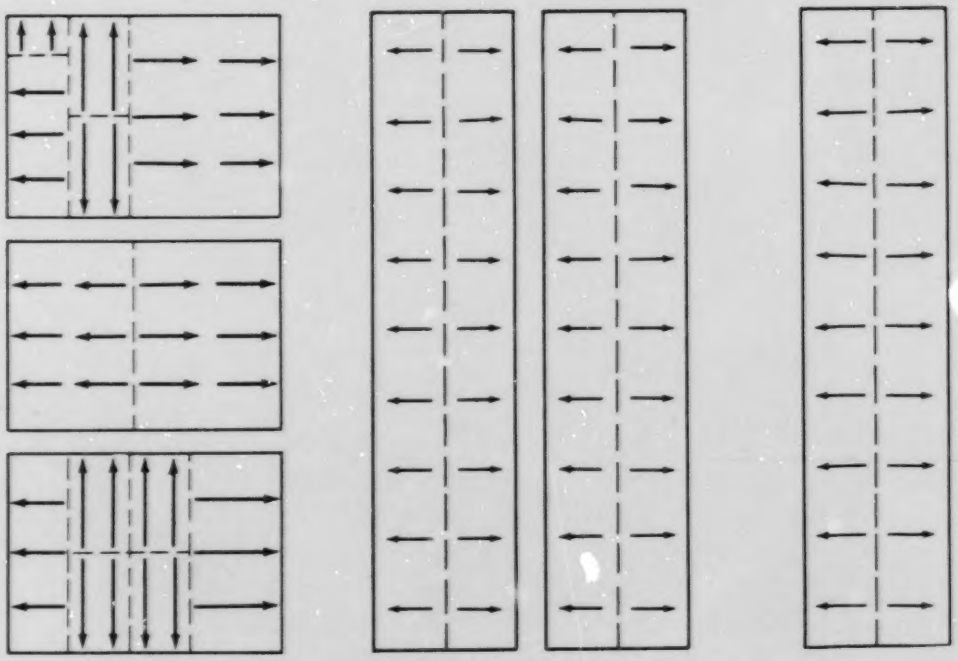
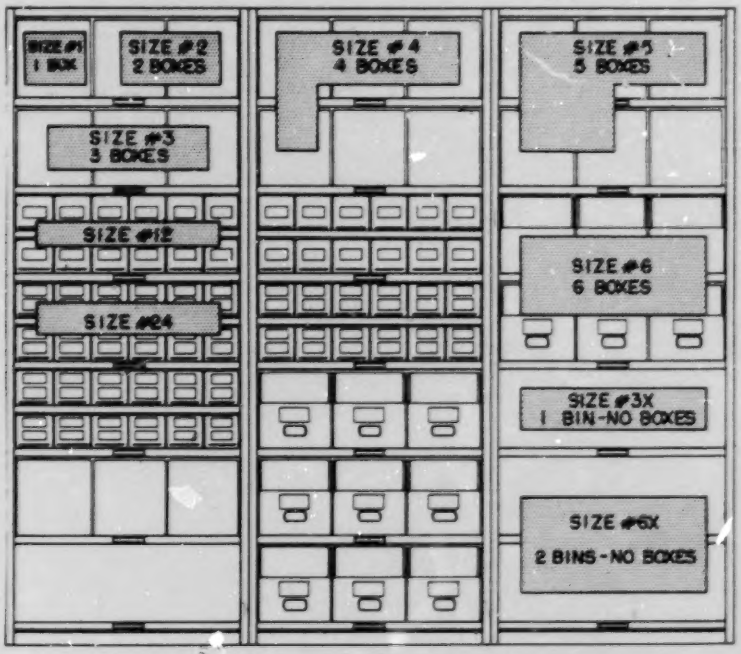


Fig 2-3. Sample storage layout for open area.

2-3. PLANNING OF STORAGE AREAS

a. Background. From time to time it is necessary to rewarehouse supplies either to comply with Marine Corps directives or because of local circumstances. Such rewarehousing may be accomplished by moving stock to new locations and storage areas or by a major repositioning of material. These methods should not be used unless the benefits derived will offset the expense of the movement. Whichever method is employed, the supervisor should know how much space will be required in the storage area to which the supplies are to be moved.

b. Retail-bin storage. In planning of storage areas, it is important to know the space size requirements for standard spaces in bin storage. Space may be occupied by shelf boxes, loose material, or individually boxed materials. Space size requirements for bin storage are shown in figure 2-4 and defined below.



NOTE

The shelf box arrangements shown above are examples of only some of the layouts that can be used. The number of small or large boxes or whole shelves to be used depends upon the physical characteristics and volume of bin stocks to be stored.

The main principles to be followed are:

1. Use shelf boxes extensively for ease of inventory and stock relocation.
2. Small lots in the center so that the majority of items are in chest high position for easy picking.
3. Heavy, large items toward the bottom with most inactive on lowest shelves.
4. Light, large items toward the top with most inactive on highest shelves.

Fig 2-4. Typical bin shelf box arrangement.

Space size	Number of large shelf boxes or inserts required
1	1
2	2
3	3
3X	0 (comprises one complete shelf space)
4	4
5	5
6	6 (3 each or 2 shelves)
6X	0 (comprises two complete shelf spaces)
12	1 (1-compartment shelf box)
24	1 (one compartment of a 2-compartment shelf box)

The standard small 1 and 2-compartment shelf boxes are 4 1/2 inches high, 5 1/2 inches wide, and 1 foot 5 inches in length. The standard large 1-compartment steel shelf box is 10 3/8 inches high, 11 1/4 inches wide, and 17 1/2 inches in length. The standard large corrugated shelf box is 8 inches high, 10 inches wide, and 16 inches in length. Smaller items are stored in small 1 or 2-compartment shelf boxes which fit 12 to the shelf.

2-4. LOCATION NUMBERING SYSTEM

a. Introduction to the location numbering system. To meet the requirements of MUMMS and its subsystem MOWASP, this numbering system was developed to simplify the routing and control of material in a mechanized handling system. This system is thoroughly responsive to mechanized materials handling; it meets every requirement of MOWASP, supports improved space management, and reduces stock selection time through introduction of a more efficient stock-picking pattern. A typical stock location number (A 22 44 17 AC) is shown in figure 2-5. We will study each part of this number in the following subparagraphs. Each position is either alpha (consisting of a letter of the alphabet) or numeric (consisting of a number).

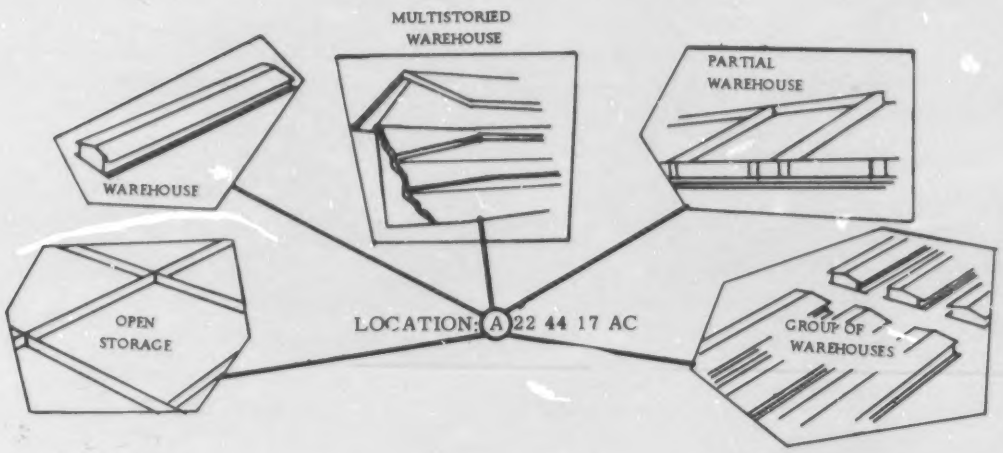


Fig 2-5. Area.

b. Area. The first digit of the location number is alpha (alphabetic) and has the capacity to designate 26 separate storage areas within a depot (fig 2-5). An area may consist of a group of buildings within a complex, an open storage area, a single building, a warehouse or shed, or part of a structure, such as floor.

c. Station. Figure 2-6 indicates the second and third digits of the location number which are numeric and have the capacity to designate 99 separate stations within an area. A station number may be used to identify stock picking stations, stations for receipt of materiel for stowing, packing stations, floors of a building, sections of a warehouse, a building within an area, collection or assembly stations, or drop-off stations.

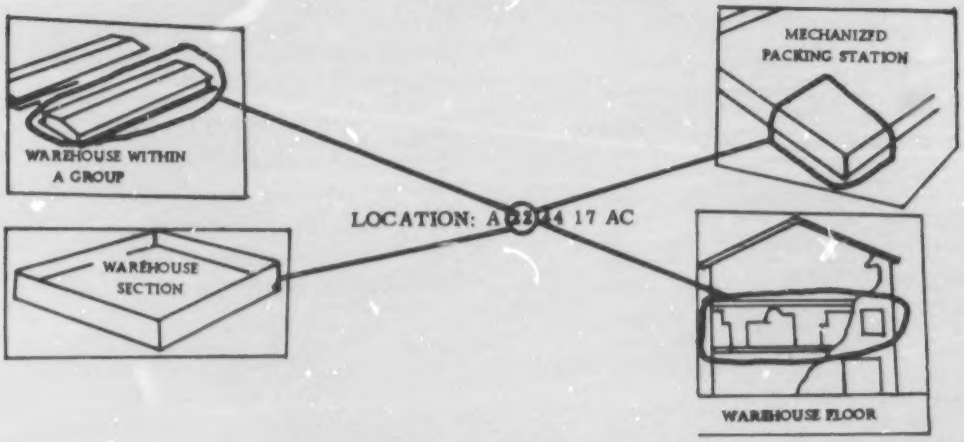


Fig 2-6. Station.

d. Aisle or row. The fourth and fifth digits are numeric and are used to designate up to 99 aisles. Aisles are numbered independently within each station starting with the number 01 up to but not exceeding 99. This independent numbering system permits a continuous flow pattern from station to station during storage or picking of supplies (fig 2-7).

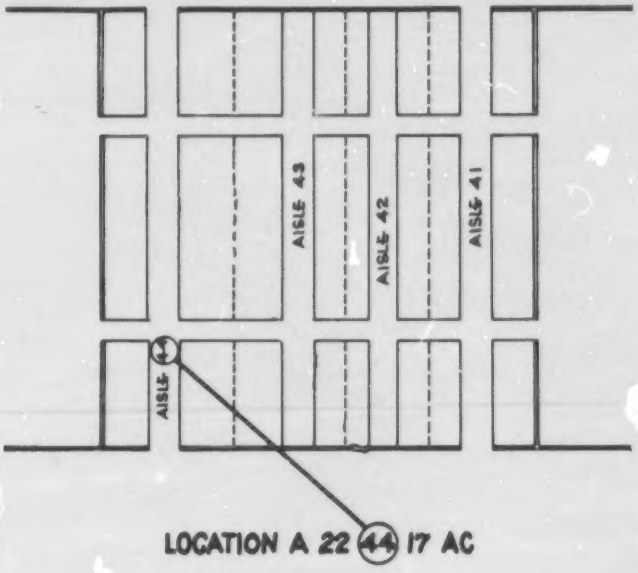


Fig 2-7. Aisles.

e. Segment. Figure 2-8 shows the sixth and seventh digits which are numeric and provide the capacity to subdivide each aisle or row into 99 segments. It can identify a short-loc storage area, stack, rack, bin, or a portion of a rack or bin. A point to remember is that the odd numbers are on the left and the even numbers are on the right of the aisle or row (based on directions of flow as related to transportation or main aisles).

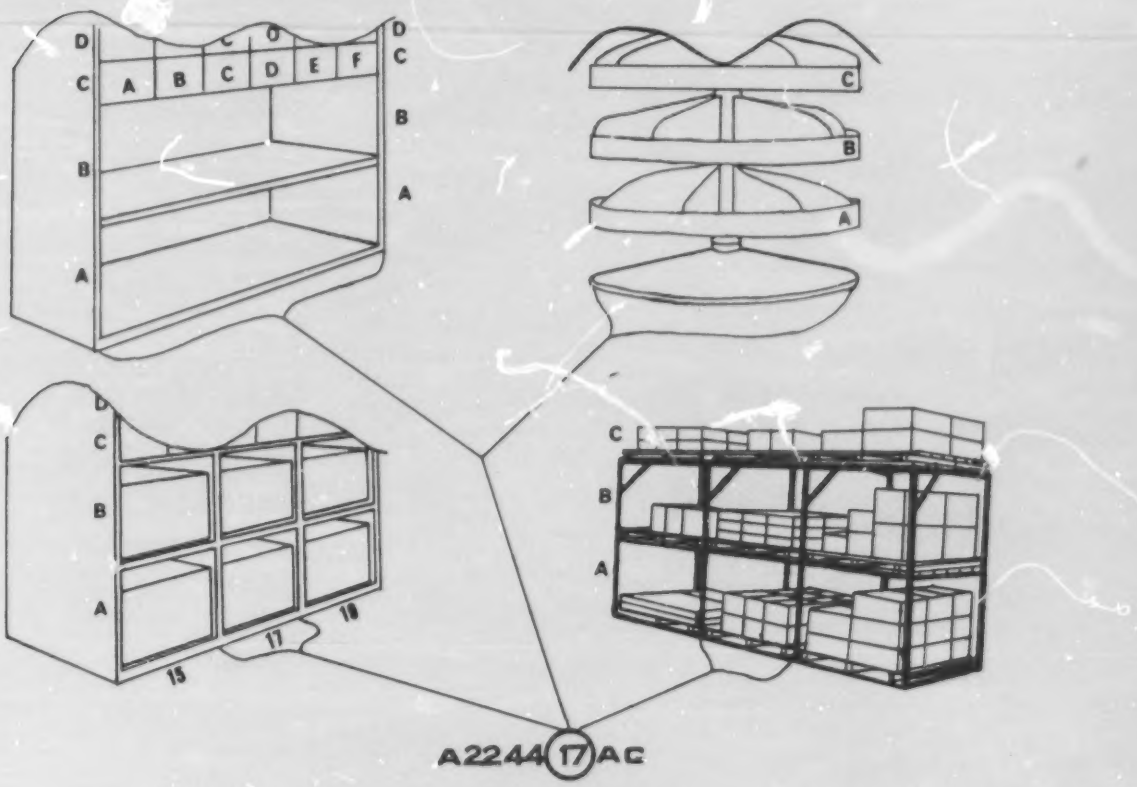


Fig 2-8. Segment.

f. Level. The level as shown in figure 2-9 is the eighth digit and is alpha (alphabetic). It is used to designate the level of storage, such as bin or rack shelf within a segment. The use of an alpha character in this position provides a capacity to identify 26 levels within each segment. When nonapplicable, such as in bulk storage, the letter A is always assigned.

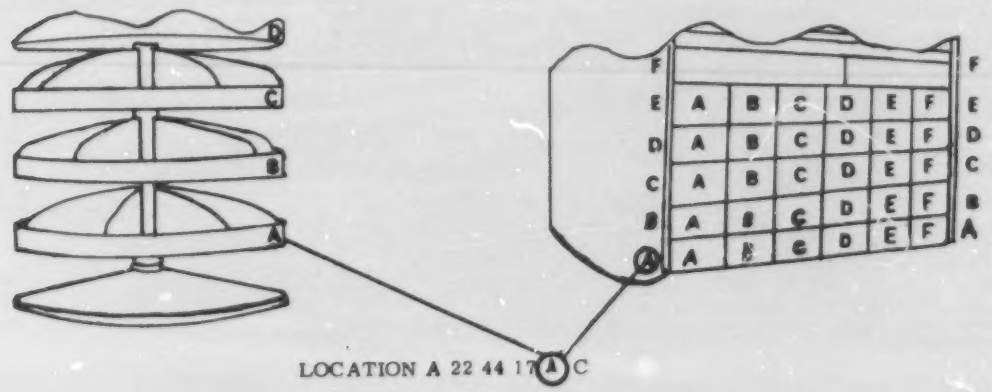


Fig 2-9. Level.

g. Compartment. Figure 2-10 shows the ninth and last digit of the numbering system which is alpha (alphabetic) and is used to designate a compartment which is a subdivision of the level within the segment and provides a capacity to identify 26 compartments within the level. When a compartment is nonapplicable, such as in bulk storage, the letter A is always assigned.

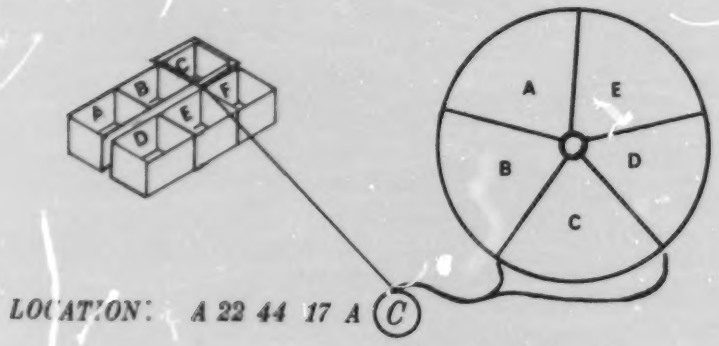


Fig 2-10. Compartment.

Section II. SPACE REQUIREMENT FACTORS

2-5. CONSIDERATIONS IN SPACE REQUIREMENT COMPUTATIONS

There are many factors which must be considered in developing a procedure for computing storage-space requirements.

a. Quantity of inventory. Although many other elements apply in computing space requirements, the quantity (item count) of the inventory to be stored remains the most important consideration.

b. Characteristics of storage facility. Since storage space deals with vertical and horizontal dimensions, facility characteristics must be closely appraised. Space computations are predicated on the quantity of inventory that can be stored within a given area; therefore, limitations such as floor capacity, structural clearances, etc., must be considered.

c. Equipment capabilities. Regardless of the potential storage height within a warehouse and the capacity, these factors would be of little value unless equipment capabilities are in balance with the overall potential in vertical space utilization. Therefore, equipment capabilities are important factors to be considered for vertical space utilization.

d. Commodity characteristics. The maximum stacking height potential cannot always be realized since the characteristics of the material, or its packaging, may not permit stacking to the height available.

e. Space allotted to other than inventory storage

(1) Storage support area. This space is allotted to functions which directly support storage operations, i.e., offices, shipping, receiving, packing and crating, preservation and packaging, inspection and identification, assembly, and box shop space.

(2) Aisles. Any passageway within the storage area. This includes cross aisles, fire aisles, and main aisles. Aisles are considered as space for storage operations.

(3) Structural loss. The amount of space not usable for storage because of construction, subterranean or physical characteristics. Structural loss is considered space for storage operations.

2-6. SQUARE, CUBE, AND WEIGHT COMPUTATIONS

To utilize storage space most effectively, you must be able to compute square and cube requirements and weight capacities of the storage area.

a. Square and cube computations.

(1) Finding the square. To find the square of an item, use the formula: length (L) x width (W) = square (S). The answer is normally expressed in square feet. The square of an item tells you how much horizontal space the item occupies, but not how much vertical space. When you use the formula L x W = S, express both the length and width in the same unit of measure, such as feet or inches. You cannot multiply feet times inches and get the square of an item. The symbol (') when used with a number indicates feet and (") indicates inches. Thus 6' equals six feet and 6 " equals six inches.

(2) Examples of figuring square:

(a) A crate is 12' long x 8' wide x 6' high. How many square feet will it occupy?

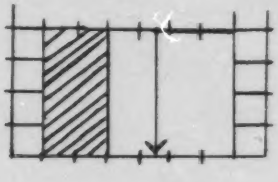
12'
x8'
96 sq ft (The height is not used for finding the square of an item.)

(b) A box is 2' long x 15" wide x 18" high. How many square feet of space will it occupy? You cannot multiply 2' x 15" so either convert the 2 feet to inches or the 15 inches to feet, then multiply. It is faster to convert to feet because when you get your answer, it will be in square feet. If you multiply inches, you must then convert your answer to feet.

TWO METHODS TO OBTAIN SQUARE FEET: First convert 15" to feet : 15" is equal to 1.25 feet as well as 1 3/12 ' = 1 1/4 :

1.25' W	2' x 1 1/4'
x 2' L	
2.50 sq ft	2/1 x 5/4 = 2 1/2 sq ft

(c) How many square feet of space does the shaded area occupy? (each grid is 52" square.) It is 2 grids wide and 4 grids long or 104" W x 208" L. Thus it is 8'8" W x 17' 4" L. (8'-8" = 8.67' or 8'-8" = 8 2/3').



17.33' L		8 2/3 x 17 1/3 =
x8.67' W		
12131	or	$\frac{26}{3} \times \frac{52}{3} = \frac{1352}{9}$ = 150 2/9 sq ft
10398		
13864		
150.2511 or 150.3 sq ft		

(3) Finding the cube. To find the cube of an item, use the formula: length (L) x width (W) x height (H) = cube. The answer is normally expressed in cubic feet. The cube of an item will give you a 3-dimensional picture by telling the amount of floor and air space that an item will require. When figuring cube, you must express the length, width, and height in the same unit of measure, such as feet or inches. It is faster to figure by feet.

(4) Examples of figuring cube:

(a) A crate is 12' long x 8' wide x 6' high. How many cubic feet of space will this crate occupy?

12' L
x8' W
96 sq ft
x6' H
576 cu ft of space occupied by the crate.

(b) A box is 2' long x 15" wide x 18" high. How many cubic feet of space will this box occupy? (To convert 15" to feet you divide by 12 = $\frac{15}{12}$ = 1.25'.)

1.25' W
x2' L
2.50 sq ft
x1.5' H
1250
250
3.750

2' x 1 1/4' x 1 1/2'

$\frac{2}{1} \times \frac{5}{4} \times \frac{3}{2} = \frac{30}{8}$ = 3 3/4 cu ft

(c) In the problem in (2) (c) above, you found the square feet of two rows, each four grids in depth. It was 150.3 square feet. If you can stack to 16 feet in height, what is the cube of these two rows?

150.3 sq ft
x16' H
9018
1503
2404.8 cu ft of space

b. Weight computations.

(1) Floor load capacity. This should never be exceeded because of possible damage to the structure and to the supplies stored therein. In most of our modern warehouses, weight will not usually be a limiting factor; however, the supervisor should always consider this factor. The floor load capacity is expressed in pounds per square foot. To find out how much an area will support, find the square feet of the area and multiply it by the floor load rating. A good formula to remember is S x R = C (square x rating = capacity).

(2) Example of weight computations.

(a) In the problem in paragraph 2-6a (2)(c), the two rows occupy 150.3 square feet of space. If the floor load capacity is 600 pounds per square foot, how much weight can be placed in this area?

150.3 sq ft
x600 pounds per square foot rating
90,180.0 pounds can be placed in these two rows.

If you have found that an incoming item will fit in these rows so far as cube is concerned, check the weight of the shipment and compare with the capacity of the area as found above.

(b) You want to stack 4 unit loads into one pallet column. Each unit load weighs 3,980 pounds and is 4' L x 4' W. The floor load capacity is 600 pounds per square foot. Would the floor load capacity be exceeded by this pallet column?

3,980 pounds per unit load
x4 unit loads
15,920 pounds, weight of proposed pallet column

4' length of unit load
x4' width of unit load
16 square feet occupied by pallet column

16 sq ft occupied by pallet column
x600 pounds capacity per sq ft
9,600 pounds, amount of weight this floor area will support

In this case the column would weigh 15,920 pounds while the floor will support only 9,600 pounds. Thus, all the vertical space cannot be utilized because of weight restrictions. There will have to be two pallet columns, each 2-unit loads high.

2-7. DEVELOPMENT OF DATA FOR USE IN SPACE REQUIREMENT COMPUTATIONS

Storage space includes vertical as well as horizontal area; therefore, in computing space requirements you should use the cubic foot rather than the square foot as a primary conversion factor in relating material to space. The following will apply in developing data to support space requirement computations.

a. Average stacking heights. The characteristics of storage warehouses influence the heights to which materials may be stacked. The composition of on-hand materials normally vary from warehouse to warehouse with resultant effects on average stacking heights; therefore, it is necessary for each warehouse to compute independent data which reflect average stacking height of material. In order to obtain proper stacking height, selected categories of items should be grouped into separate groups to determine the average height of each category. The material may not be stacked to the potential height of the storage area. For instance, if the average stacking height of each category is 10 feet but the storage area is constructed to allow stacks 14 feet in height, the additional 4 feet of space is considered to be potential storage height. In establishing material stacking heights, you should consider the height to which supplies are capable of being stored in accordance with proper warehousing practices. Once you have determined the material stacking heights, it is a simple matter to compute the space required if the material is to be stacked to the potential storage height.

b. Square foot computation. After developing the stacking height data, you should reconcile such information with the amount of floor area (square footage) that is currently utilized in stowing material. If allowable vertical potential is not fully occupied, make sure to identify the current excessive occupancy of floor area in order to reflect the actual net square feet of storage space required to store material. Where possible, rearrange and extend the height of stacking so as to bring the actual storage in balance with the potential and equalize the amount of net square feet of space required with the amount of net square feet actually occupied.

c. Example problem. A survey has indicated that a certain material is capable of being stacked to an average height of 14 feet. Facility characteristics will allow this potential without exception. The survey also disclosed that materials currently occupy 218,000 square feet of floor area; however, the stacking height to which material is actually stored averages only 12 feet. How many square feet are required to store the material at the potential storage height of 14' (figs 2-11 and 2-12)?

Part A: P = Potential storage height
A = Actual storage height
E = Space occupancy effeciveness

Part B: S = Square feet occupied by material
E = Space occupancy effectiveness
R = Square feet required to store material

VERTICAL SPACE OCCUPANCY EFFECTIVENESS - USE PART A ABOVE:

$$\frac{A}{P} = E \quad \frac{12'}{14'} = .86' = 86\% = E$$

To determine sq. ft. required to store material at the potential height of 14' use Part B above:

S x E = R or 218,000 sq. ft. x .86 = 187,480 sq. ft. required.

d. Therefore, a savings in sq. ft. of 30,520 sq. ft. of space is possible by stacking to 14' vice 12'. (218,000 at 12' and 187,480 at 14').

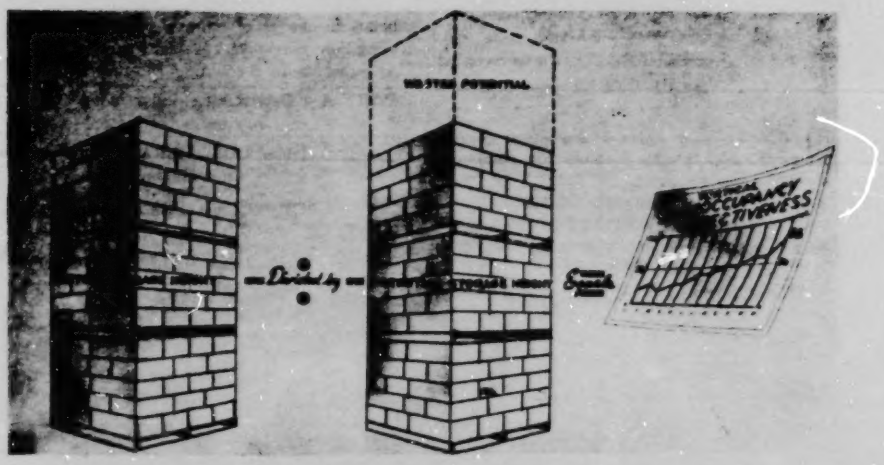


Fig 2-11. Vertical space occupancy effectiveness, 12/14 = 86%.

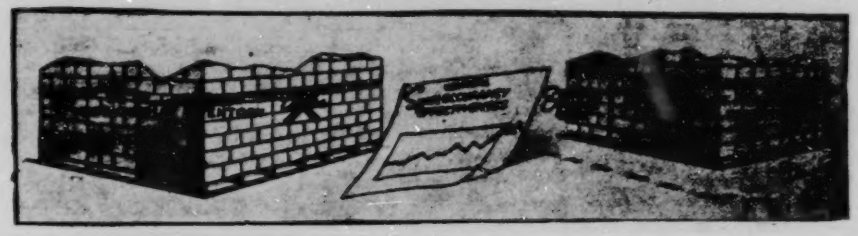


Fig 2-12. Actual feet required to store material
218,000 x .86 = 187,480.

Section III. SPACE CONTROL AND REPORTING

2-8. STORAGE AND WAREHOUSE FACILITIES

Although it is the policy of the Marine Corps to obtain the maximum use of the storage areas and warehouses at its disposal, there are times when existing facilities are inadequate. For this reason, Marine Corps Order P4450.7_ was published to provide instruction on methods of acquisition of facilities.

2-9. SPACE CONTROL

a. Introduction. Determination of space requirements can be defined as "finding out how much space you need." Space control can best be described as "effective use of available storage areas." In other words, once storage space is available, controls should be established to prevent wasted areas. A successful storage operation depends on adequate storage space and facilities, competent personnel to operate and administer them, and the proper equipment to handle and store the supplies therein. Of these factors, attention is directed first to space. The availability of storage space is limited and sometimes critical. It cannot be had just for the asking but is obtained by allocation from higher authority on the basis of need. The proper allocation of space requires careful planning. To be effective, planning in turn requires close control and accurate uniform reporting of space. The importance of space control cannot be overemphasized. The use of a planograph is an excellent tool for maintaining space control. It enables storage personnel to plan for the effective utilization of space within the storage area itself. A complete and currently maintained planograph portrays the actual manner in which the gross storage space within a warehouse, shed, or open area is used.

b. Basic drawing of the planograph. The planograph is nothing more than a floor plan which outlines the entire warehouse, shed, floor of a multiple story warehouse, or other area scaled to one-sixteenth inch per square foot of floor space. A good planograph should show the following:

(1) The actual layout of space, including offices, heads, boiler rooms, doors, assembly areas, firewalls, columns (posts), aisles, rows, and storage blocks. The square feet of space used for storage and working aisles should be shown to aid in space planning and materials handling operations.

(2) Floor markings which designate aisles and rows are entered in the legend.

(3) The stock location code (area) should be indicated in the legend of the planograph.

(4) The planograph scale (1/16" = 1' is common) should appear in the legend.

(5) Stacking heights permitted should be indicated in the legend.

(6) The floor load rating should be indicated in the legend.

(7) Door numbers should be shown, and the legend should indicate the width and height of the doors.

(8) Direction of stock picking. (Arrows may be used to indicate direction.)

c. The planograph overlay. If the planograph contains the information listed above, it is ready for use by the warehousing supervisor in maintaining control of the space for which he is responsible. Before the planograph is used, it should be covered with acetate so that markings may be made with a grease pencil, thus permitting removal of information which has served its purpose. The following information should be included on the acetate overlay of the planograph.

(1) Show vacant space by shaded areas. By this method, you can readily determine where incoming supplies may be stored and inform the warehouse manager that vacant space is available. You may also mark to show where the various Federal supply groups and condition code items are stored.

(2) To illustrate pallet racks and bin sections, you may mark to show the number of openings available on a location or in a row. The overlay shows day-to-day changes in available space.

(3) By using colored grease pencils, you can show such potential vacant space as partially emptied rows or full stacking heights not utilized. With this information, you know where additional space can be recovered in an emergency and where stock may be repositioned during slack periods.

d. Storage space status report. A storage space status report must be prepared periodically for each section of the warehouse or storage area. When these reports are received in the office of the storage manager, they are filed in building number sequence. This report not only shows vacant and occupied space but also shows potential vacant space. The manager should analyze this report thoroughly. When the potential vacant space reaches 5%, it warrants serious consideration, and action should be taken to reclaim this space as quickly as possible. Now let's take a look at the types of space and the meaning of each:

(1) Actual vacant space. This is usable space which is not occupied by material or storage bins and racks.

(2) Potential vacant space. Net usable space which is temporarily not available for storage because of repair or alteration to the storage area or space that can be made available by rewarehousing, elimination of honeycombing or utlization of maximum heights in stacking. There are three types of potential vacant space:

(a) Type A. In most instances this type of space loss is due to short spaces in front of stacks or in the middle of stacks. This space can be reclaimed and must be reported as type A potential vacant space.

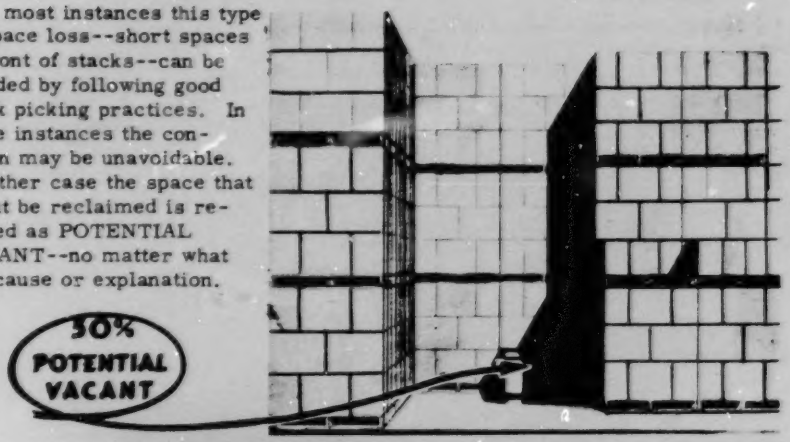
(b) Type B. Type B potential vacant space is caused by low stacking of materials. If materials can be stacked to a height of 15 feet and they are stacked to only 12 feet, the space on top is type B vacant space.

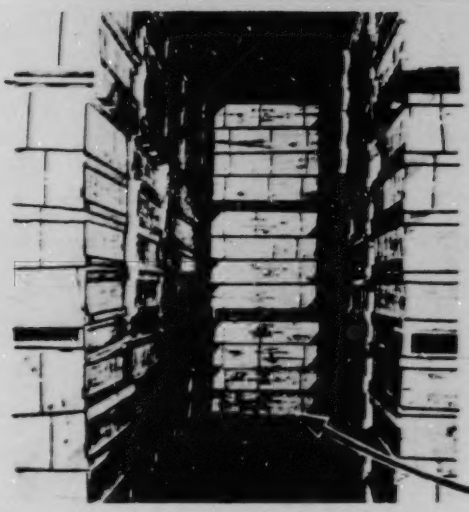
(c) Type C. Type C potential vacant space is space that is temporarily unavailable because of repairs to the storage area.

(3) Occupied 100%. There may be cases where you will have lots of space between the top of stacks and the ceiling but due to the load limit of the floor, you cannot place any more material on these stacks. In these instances, regardless of the vacant space on top of the stacks, this is considered as 100% occupied. Figures 2-13 through 2-16 illustrate the types of vacant space you will encounter as a warehouseman.

Type A - Short Spaces in Front of Stacks

In most instances this type of space loss--short spaces in front of stacks--can be avoided by following good stock picking practices. In some instances the condition may be unavoidable. In either case the space that might be reclaimed is reported as POTENTIAL VACANT--no matter what the cause or explanation.



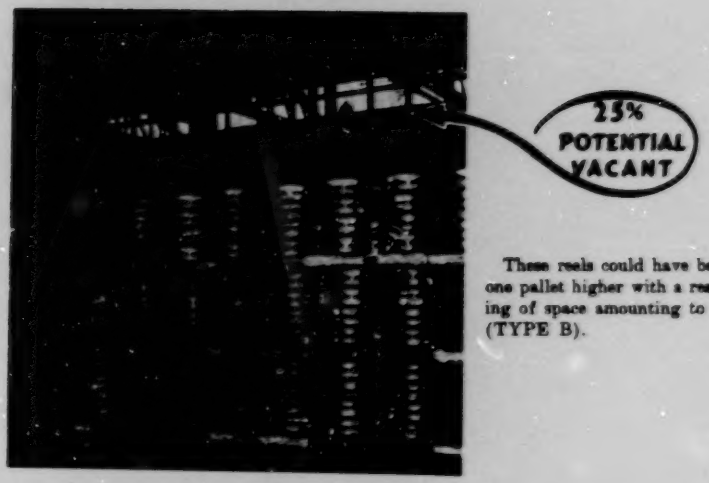


Here are items (small-arms ammunition) which must be stored by lot number, thus causing short spaces in front of stacks. POTENTIAL VACANT results.

Generally speaking, warehousing practice that leaves short spaces in the midst of a stack is not good warehousing. But good or bad, avoidable or unavoidable, such spaces are reported as POTENTIAL VACANT. Fifty percent of the center row in the photograph is occupied; accordingly the rest is POTENTIAL VACANT (TYPE A).

Fig 2-13. Type A potential vacant space.

• POTENTIAL VACANT



These reels could have been stacked one pallet higher with a resultant saving of space amounting to 25 percent (TYPE B).

Another subject for "Mental Rewarehousing"

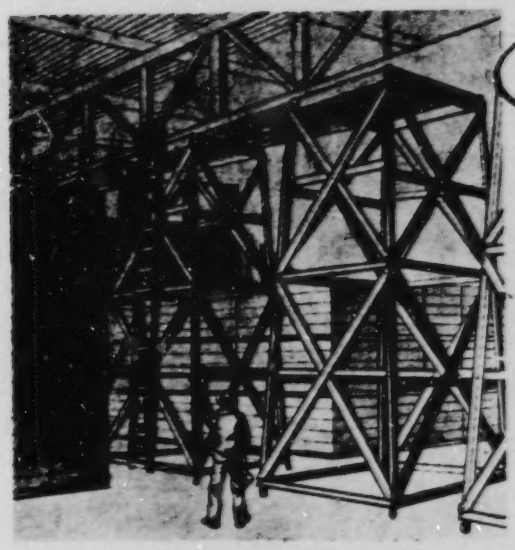
As a practical matter it is desirable to supplement "mental rewarehousing" with paper computations. Suppose you have a situation like that shown above. As noted in the caption, another tier could be stacked above the three already in place.

By simple inspection we can see that one-fourth, or 25 percent, of the available height is not utilized. This means that 25 percent of the floor space occupied by this stack could be saved by rewarehousing; hence if the stack occupies 1,200 square feet of floor space, then 25 percent or 300 square feet would be reported as POTENTIAL VACANT.

STORAGE SPACE IS CRITICAL. Use it wisely. Report it accurately, especially take action to recover POTENTIAL VACANT. This is "found" space. Don't overlook it.

Fig 2-14. Type B potential vacant space.

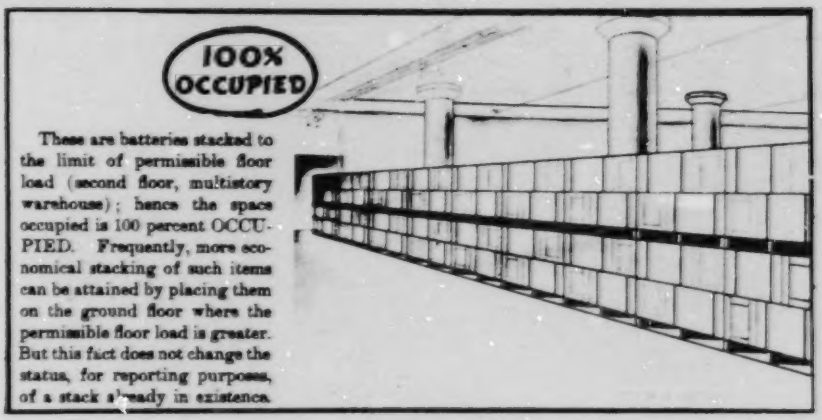
Type C - Space Temporarily Unavailable



100% POTENTIAL VACANT

This is an example of warehouse space undergoing reconstruction because original construction proved unsafe (weak supporting pillars). Not only the space occupied by the scaffolding but the working space required by the construction crew is temporarily unavailable for storage, therefore POTENTIAL VACANT (TYPE C). Note that when supplies are removed from an area because of conditions requiring repair or alteration, such space is reported as POTENTIAL VACANT, even though reconstruction has not yet begun.

Fig 2-15. Type C potential vacant space.



100% OCCUPIED

These are batteries stacked to the limit of permissible floor load (second floor, multistory warehouse); hence the space occupied is 100 percent OCCUPIED. Frequently, more economical stacking of such items can be attained by placing them on the ground floor where the permissible floor load is greater. But this fact does not change the status, for reporting purposes, of a stack already in existence.

Fig 2-16. Storage height with consideration of floor load limitations.

2-10. SPACE REPORTING

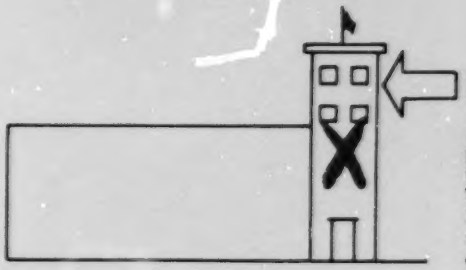
a. Purpose. The storage space utilization and occupancy reports prepared by Marine activities serve as a basis for planning space requirements to meet both current and future needs. These reports also serve as justification for requests in appropriation increases for construction of additional warehouses.

b. Measuring warehouse space. Before you can report space, you must know how to measure the storage warehouse or area. Figure 2-17 illustrates the types of buildings and how to measure the gross space storage area.

You measure all these structures by taking inside dimensions. The width in feet is multiplied by the length in feet and the result is the square-foot area, or TOTAL GROSS STORAGE AREA. This is less than the outside dimensions by the thickness of the walls. You don't pay any attention to inside fire walls, passageways, ramps, stair wells, or such matters. However—

IF YOU HAVE A BUILDING LIKE THIS

in which there is a cutback in the walls you measure the cutback and exclude it from TOTAL GROSS STORAGE AREA.



OR LIKE THIS

in which there is a tower for offices, or any portion not designed for storage (though in a storage building) you exclude it from TOTAL GROSS STORAGE AREA. However, if this tower had been designed for storage and later converted to storage offices, you would include it in TOTAL GROSS STORAGE AREA. Even if it was not designed for storage but is used for that purpose you report it during the period of use.

Fig 2-17. Measuring gross storage area.

c. Net storage space. You have measured the warehouse and have the total gross storage area. Now you must compute the net storage space. Figure 2-18 gives you an example of how you can compute the net storage space.

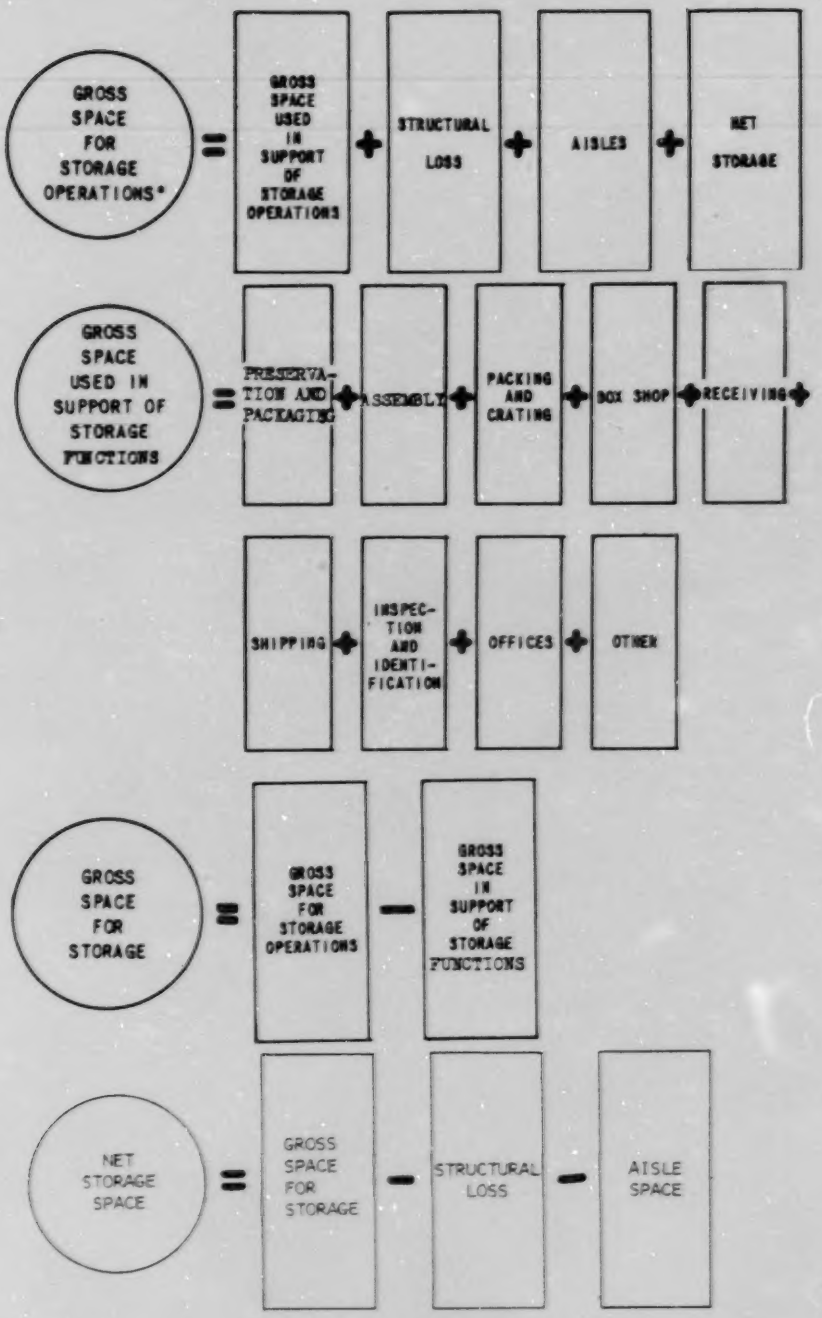


Fig 2-18. Computing net storage space.

As explained above, gross space for storage operations less gross space used in support of storage functions equals gross space for storage. By deducting structural loss and aisle space from the gross space for storage, we obtain the net storage space. By deducting the net vacant space from the net storage space we obtain the net occupied space.

d. Supply Facility Management Report. Supply facility management reporting, requirements planning, and acquisition justification are reported to the Naval Supply Systems Command (NAVSUP) using the Navy Format/Worksheet DD Form 805 (fig 2-20). In addition to the Navy Format/Worksheet DD Form 805, each reporting activity must provide one set of punched cards to accompany each report. The punched cards are prepared using the format shown in figures 2-21 and 2-22.

(1) Reporting Requirements. Marine Coprs "Air Support" shore activities and Marine Corps "Ground Support" activities having 20,000 gross square feet or more of general and/or ammunition supply facilities are required to submit the report semi-annually. Reports are submitted to HQMC (LMM-2) by 15 June and 15 December of each year. Reports are reviewed and forwarded to NAVSUP no later than 10 days after 30 June and 31 December of each year. Adherence to this schedule is critical in order to meet NAVSUP Automated Data Processing (ADP) schedules and DOD report submission requirements. The submission of this report by "Air Support" and "Ground Support" activities is explained in MCO P4450.7_.

(2) Newly activated activities or activities acquiring a total of 20,000 gross square feet or more should commence semi-annual reporting as of 30 June or 31 December following such activation and/or acquisition.

(3) After submission of initial reports, reporting activities submit change data only as the NAVSUP ADP operation retains the latest prior data submissions or magnetic tape.

(4) Initial data and change data should only be entered in clear (unshaded or non-cross hatched) data blocks of the Navy Format/Worksheet DD Form 805. The NAVSUP computer will automatically compute and print data, as appropriate, in both clear and shaded blocks. No data should be entered or printed in cross-hatched blocks.

Note: Date on lines preceded by an astrisk (*) should be representative of ratios whose units of measure are defined by the printed description of such lines except that data on lines 10d ((36)) and 11d ((41)) should be representative of feet. Data on all other lines should be reported and printed to the nearest thousand square feet, cubic feet or measurement tons of material in store. For example, a value of 1499 should be reported as 1 and a value of 1500 should be reported as 2.

e. Preparation of Navy Format/Worksheet DD Form 805. Following are detailed instructions in the preparation of the report. (Refer to foldout figure 2-20 on page 2-24 while reading the following instructions)

(1) Header section.

(1) Fy. Insert the last two digits of the fiscal year being reported.

(2) Qtr. Insert quarter being reported, i.e., 1 for December and 3 for June.

(3) UIC. Enter UIC of activity reporting from Chapter 5, Volume 2 of the NAVCOMPT Manual.

(4) Suffix. Enter suffix code for the activity.

(5) Name of Installation. Insert activity type/name.

(6), (7), (8), (9), (10) Leave blank. NAVSUP will insert required data in these spaces.

(2) Section A: Gross Storage Space - Square Feet.

(11) Activities reporting for the first time will enter the words "NONE-INITIAL REPORT." After initial report no entries are required as data entries will be printed by the NAVSUP computer using prior data retained on magnetic tape.

(12) Enter the amount of reportable space at the activity. Be certain to use inside dimensions associated with outside dimensions reported on line 2a ((13)). Totals for each column must be supported by gross square feet (gsf) data reported on Storage Unit Reports (NAVSUP form 605).

(13) Enter the amount of outside square feet applicable to the gross square feet reported on line 2 ((12)).

(14) Enter any amounts of space representing supply facilities being furnished by other Navy or DOD activities, by other Government agencies, or secured from private enterprise through "ingrant" agreements or under the DOD Commercial Warehouse Service Plan.

(15) Leave blank. ADP operations apply.

(16) Enter, as appropriate, the amount of gsf included in the following categories:

a. Space so deteriorated that it fails to provide a sufficiently protective environment for the storage of material.
b. Space that is unsafe for any storage purpose or operation.
c. Space that, because of its location, represents an unwarranted security risk or its occupancy would be in violation of a local safety ordinance.

(17) Enter as appropriate any amount of gsf that is recoupable for supply operations and has been inactivated, secured and placed in standby status.

(18) Enter as appropriate any amount of gsf recoupable for supply operations that has been outgranted (by license, permit, lease, host-tenant use agreement, etc.) to non-DOD users for their operation.

(19) Enter as appropriate any amount of gsf of supply facilities outgranted (by license, permit, host-tenant use agreement, etc.) to other Navy/Marine Corps or DOD users for their operation.

(20) Enter any portion of gsf reported on line 6 ((19)) that has been outgranted for operation by any Navy or Marine Corps activity other than the reporting activity.

(21) Leave blank. ADP operations apply.

(22) Enter the amount of gsf assigned for accommodation storage of non-stock (non supply system) material. Non-stock material is defined as material other than that required to maintain supply system stock levels.

(23) Leave blank. ADP operations apply.

(24) Enter gsf amounts of internal structural loss as appropriate. In covered storage areas, such items as rest rooms, columns, firewalls, elevator shafts, stairwells, ramps, steam pits, switch panels, loading wells, and door clearances will be considered structural loss. In open improved storage areas, such items as fire breaks, stream beds, railroad tracks, and clearance for utility lines should be considered as structural loss.

(25) Enter amounts of gsf used for aisles in storage areas as appropriate. Exclude aisles in support areas.

(26) Leave blank. ADP operations apply.

(3) Section B: Net Storage Space.

(27) Leave blank. ADP operations apply.

(28) Enter any amount of net square feet (NS) occupied by erected bins.

(29) Enter any amount of NS occupied by erected racks.

(30) Enter the total amount of NS available for storage of material in bulk areas.

(31) , (32) Leave blank. ADP operations apply.

(33) Enter as appropriate in columns C1 through G2, the value of line 9a ((28)) (for each type of space) multiplied by the average clear stacking height (SH) within each type of space at the activity.

(34) Enter as appropriate in columns C1 through G2, the value of line 9b ((29)) (for each type of space) multiplied by the average SH value for all rack areas within each type of space at the activity. Total cubic feet (TCF) reported under columns H and I will reflect actual occupancy by erected racks including any TCF capable of being occupied if material were to be/is stored on the top shelf or structural levels thereof.

(35) Enter as appropriate in columns C1 through G2, the value of line 9c ((30)) (for each type of space) multiplied by the average SH value for all bulk areas within each type of space at the activity. TCF reportable in column H will be computed by assuming an average SH value of at least 10 feet.

(36) , (37) Leave blank. ADP operations apply.

(38) Enter as appropriate the attainable cubic feet (ACF) in bin areas which is the total cubic volume of erected bin structures. Such cubic volume is the product of the outside dimension of the bins; i.e., length x width x height, or alternately, the value of line 9a ((28)) (for each type of space) multiplied by the average height of bins in each type of space. Cubic volume above bin structures will not be included.

(39) Enter as appropriate the ACF in/above racks which is the product of the racks' outside dimensions, i.e., length x width x height. Cubic volume above the racks will be included to the extent that use of such space is permitted by safety limitations and the capacity of available materials handling equipment (MHE).

(40) Enter as appropriate the value of NS in bulk areas reported on line 9c ((30)) (by type of space) multiplied by the stacking height permitted by safety restrictions and floor load limitations attainable with available MHE and storage aids. Cubic volume beyond the reach of available MHE lift heights and floor load limitations will not be reported even though safety limitations or permissable stacking heights have not been attained. The cubic capacities reportable on this line, as well as lines 11a ((38)) and 11b ((39)), are limited to those attainable under present storage arrangements and achieved with available equipment. The cubic capacity of improved open storage space (column H) shall generally be computed by using an average stacking height of 10 feet except where local conditions and actual commodity characteristics dictate a specific stacking height. The cubic capacity of unimproved open space (column I) will be that actually occupied and reported on line 13 ((45)), column I.

(41) , (42) , (43) Leave blank. ADP operations apply.

(44) Enter as appropriate that portion of line 9c ((30)) that is occupied by materiel in bulk areas.

(45) Leave blank. ADP operations apply.

(46) Enter as appropriate the ACF capacity of bin and rack compartments/shelves and of bulk space above NS floor areas (as indicated on lines 11a ((38)), 11b ((39)), and 11c ((40)), respectively) utilized partially or wholly by Navy/Marine Corps owned materiel. The methodology for determining bin and rack utilization/occupancy may comprise statistical sampling or may involve maintenance of a simple record of available and occupied space.

(47) Leave blank. ADP operations apply.

(48) Enter as appropriate the amounts of utilized/occupied ACF that are common or cross-serviced for storage of other DOD material. Include ACF utilized/occupied by household goods (HHG) and personal effects belonging to military service personnel.

(49) Enter as appropriate that portion of line 13b ((47)) that is common or cross-serviced for storage of non-DOD material. Include ACF utilized/occupied by GSA National Stockpile Materiel.

(50) Leave blank. ADP operations apply.

(51) Enter an estimated value for the cubic feet of pure materiel (including pallets on which materiel is stored in bulk and rack storage areas) that occupy one cubic foot of "adjusted ACF utilized" (as reported on line 13c ((50)). NAVSUPINST 4450.22 provides a table which may be used to arrive at the estimated value.

(52) through (58) Leave blank. ADP operations apply.

(59) Enter as appropriate the estimated portions of lines 9c ((30)) and 14 ((55)) that are not obligated to any future requirements.

(60) , (61) Leave blank. ADP operations apply.

(62) through (64) Enter as appropriate the estimated portions of line 15 ((57)), and lines 11a ((38)), 11b ((39)), and 11c ((40)), respectively, that are not obligated to any future requirements.

(65) , (66) Leave blank. ADP operations apply.

(67) through (69) Enter as appropriate estimated amounts of cubic space in utilized ACF bin, rack, and bulk storage areas, respectively, within space reported on line 15 ((45)), and lines 11a ((38)), 11b ((39)) and 11c ((40)), respectively, that can be recouped through rewarehousing.

(70) Leave blank. ADP operations apply.

(4) Section C: First Year of 5 Year ACF Facility Requirements Analysis.

(71) Enter as appropriate those amounts of ACF required to satisfy obligated requirements for the next fiscal year. Requirements for material currently stored in unimproved storage space (column I), for which continued open storage is adequate, will be included in column H. ACF values reported will reflect TCF values computed by multiplying values of SH by values of NS developed for and appearing on the activity's Basic Facility Requirements List (BFRL) for each category code, groups of category codes, or basic categories identified in column headings of this form.

(72) , (73) Leave blank. ADP operations apply.

(74) Enter as appropriate the amounts of ACF recoupable through activation of space in standby (from the line 4 (17)) and the retrieving of outgranted space (from lines 5 (18) and 6 (19)). These gsf quantities will be adjusted by the rations existing between lines 11 ((37)) and 7 ((21)) to yield a ratio of ACF per gsf.

(75) Enter as appropriate the amount of "Cube Loss" (the difference between lines 10 (32) and 11 (37)) that can reasonably be recouped through rewarehousing and/or the addition of new/additional MHE and associated storage aids.

(76) Enter as appropriate any amounts of unusable space (from line 3 (16)) that may be rendered usable by accomplishing major repair or modification. Such gsf quantities will be adjusted by the ratio existing between lines 11 ((37)) and 7 ((21)) to yield a ratio of ACF pers gsf. The repairs/modifications to be reported herein are those estimated to cost $50,000 or more for each structure or open storage area involved.

(77) Enter as appropriate the ACF of space in need of replacement, the repair of which is not economically justifiable and for which there is a continuing requirement.

(5) Section D: Years 2 through 5 of Five Year ACF Facility Requirements Analysis.

Note: Data reported in columns entitled "Covered" will represent a summation of data reported in (3), Section C, under columns C1 and G2.

(78) Enter for each fiscal year projected summations of data reported on line 11 ((37)) that include any anticipated changes in the amounts of ACF available as the result of on-going or anticipated program changes.

(79) Enter for each fiscal year summary totals of data reported on line 19 ((71)) with ammendments thereto to reflect on-going or anticipated program changes, as appropriate.

(80) Leave blank. ADP operations apply.

(81) Enter for each fiscal year summary totals of data reported on line 20 ((73)) with ammendments thereto to reflect on-going or anticipated program changes, as appropriate.

(82) Explain changes in amounts or types of covered space and open improved space when the changes on line 2 ((12)) of the prior 30 June report reflect differences of 5,000 gsf or more of covered space or 20,000 gsf or more of open improved space. When the difference in covered space reflects a diversion equal to or exceeding 40,000 gsf since the prior 30 June report, cite the assistant Secretary of Defense-Installations and Logistics (ASD (I & I)) letter that authorized such diversion. The diversion must have been processed via NAVSUP (Warehousing Branch) in consonance with paragraph 8 of NAVSUPINST 4450.22. Additionally, differences of 5,000 gsf or more in covered storage space that reflect acquisition, transfer, reassignment or disposal of General Supply Facilities will have been subject to NAVSUP approvals stipulated in NAVSUPINST 4450.21.

(83) This "Certification" statement must be completed with the signature and title of the individual responsible for preparation and submission of the activity/site report.

CARD #1
(lines 1 through 22)

Header Title	Col	Char	Fields	Remarks
Report No.		N	1	Always "L"
Date		N	2-3	Last two digits FY being reported
Freq		N	3	Quarter being reported, i.e., 1=Dec; 3=June
UIC		N	5-9	UIC and Suffix code of the reporting activity/site
UIC SUFFIX		A	10-11	
Line No.		A/N	12-15	Left justify. Leave unused spaces blank, i.e., 02.; 13B1
General Purpose	C1	N	16-19	Right justify. Each reported field must be completely filled with numbers numbers and/or zeros. Do not punch commas. When reducing a quantity to zero, fill entire field with zeros.
Controlled Humidity	C2	N	20-23	
Flam/Hazardous	C3	N	24-26	
Special Operations	C4	N	27-30	
Chill	D1	N	31-33	
Freeze	D2	N	34-36	
Shed	E	N	37-39	
Igloo	F1	N	40-43	
Above Ground	F2	N	44-47	
Inert	G1	N	48-51	
Deep Freeze	G2	N	52-54	
Open Improved	H	N	55-59	
Open Unimproved	I	N	60-64	

Under no circumstances will cards or transmittal sheets be submitted for shaded blocks.

Fig 2-21. Punched card instructions (card #1).

CARD #2
(lines 23, 24 and 26)

Header Title	Char	Fields	Remarks
Report No.	N	1	Always "2"
Date	N	2-3	Last two digits of FY being reported
Freq	N	3	Quarter being reported, i.e., 1=Dec; 3=June
UIC	N	5-9	UIC of reporting activity
UIC SUFFIX	A	10-11	Suffix of site
Line No.	N	12-15	
2nd FY	N	16	Always "2"
Covered	N	17-22	*Data for 2nd FY
Open	N	23-28	*Data for 2nd FY
3rd FY	N	29	Always "3"
Covered	N	30-35	*Data for 3rd FY
Open	N	36-41	*Data for 3rd FY
4th FY	N	42	Always "4"
Covered	N	43-48	*Data for 4th FY
Open	N	49-54	*Data for 4th FY
5th FY	N	55	Always "5"
Covered	N	56-61	*Data for 5th FY
Open	N	62-67	*Data for 5th FY

* Right Justify. Each reported field must be completely filled with numbers and/or zeros. Do not punch commas. When reducing a quantity to zero, fill entire field with zeros.

Under no circumstances will cards or transmittal sheets be submitted for shaded blocks.

Fig 2-22. Punched card instructions (card #2).

f. Storage Unit Report, NavSandA Form 605. The individual Storage Unit Report, NavSandA Form 605, is a one-time or change-in-situation report. This report is submitted as an initial report or when a change has occurred in a storage unit either by structural alteration or by diversion of warehouse space to another use. When a change occurs in the structural alteration of storage space, a revised NavSandA Form 605 must be submitted with the first DD Form 805 submitted after such alteration of diversion. Figure 2-23 shows a completed NavSandA Form 605.

SUPPLY FACILITY MANAGEMENT REPORT

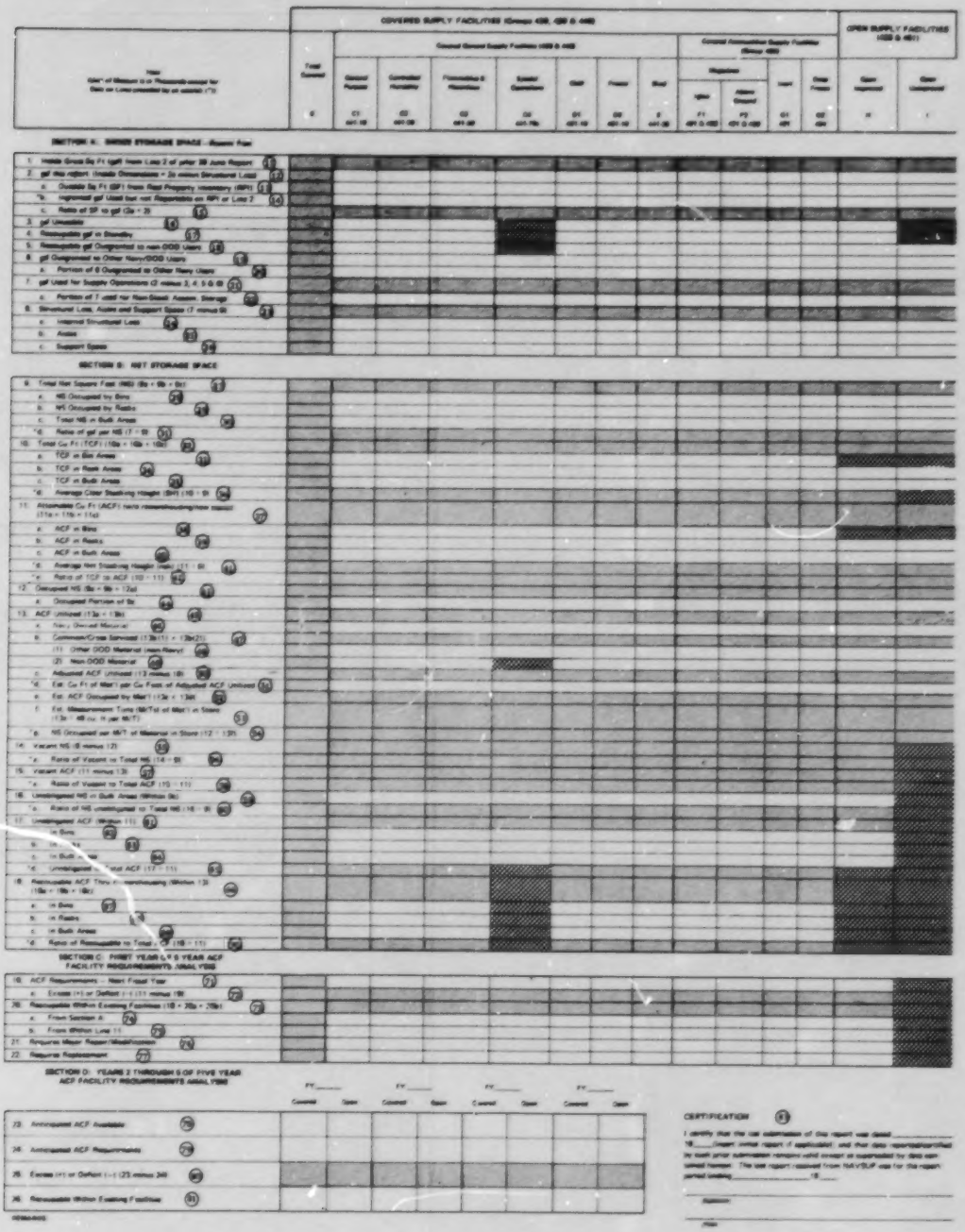


Fig 2-20. Supply Facility Management Repor (Navy Format/Worksheet for DD Form 606).

STORAGE UNIT REPORT
NAV. S. AND A. FORM 605 (REV. 1-57)

(1) DN-4450-3

DATE 25 November 19

GENERAL INFORMATION

INSTALLATION (Base and location) (2): Marine Corps Logistic Base, Albany, Georgia			N.D. (3): 6th	STORAGE UNIT NO. (4): 1234
CLASSIFICATION OF UNIT (5): Warehouse	LOCATION (6): Station		YR. BUILT (7): 1955	CONDITION (8): Excellent
FOUNDATION (9): Concrete Pier and Post (Reinf)	SUPERSTRUCTURE (10): Concrete (Reinf)	FLOOR (11): Concrete (Reinf)	ROOF (12): Concrete Slab w/Tar and Slag	
WATER SUPPLY (13): Station	TYPE OF SPRINKLER SYSTEM (14): Overhead, Wet	TYPE OF HEATING PLANT (15): Hot Air	TYPE OF ELECTRICITY (16): 120-208 3ph 60 cyl AC	
OWNED BY (17): Marine Corps-owned		DIMENSION (Inside) (18): 200x1025	TOTAL FLOOR AREA (19): 205,000	

FLOOR	FLOOR LOAD (Lbs per sq ft.)	GROSS SPACE (Square feet)	CEILING HEIGHT	STACKING HEIGHT	SPACE USED FOR OTHER PURPOSES: PURPOSE (25)	GROSS SQUARE FEET
(20) 1	1500 (21)	205,000 (22)	26' 6" (23)	20 (24)	Administrative	209
					Office	209
	TOTAL	205,000			TOTAL	418

(26) GROSS SPACE FOR STORAGE OPERATION (Square feet): 204,582

	(Gross)	(Net)
(27) TYPE OF SPACE: Controlled Humidity	164,000	128,524
Controlled Humidity, security	41,000	33,755

(28) STATIONARY MATERIALS HANDLING EQUIPMENT: Monorail, floor-mounted, 3-hoist, 2-ton capacity, each

(29) TRANSPORTATION FACILITIES: Railroad platform, car door level, 20-car capacity (2 per door)
Truckside platform, body level, 20-car capacity (2 per door)

Fig 2-23. Storage Unit Report, NavSandA Form 605.

g. Preparation of NavSandA Form 605. Each warehouse, shed, and/or improved open storage area plot is considered as one individual storage unit when the amount of gross space for operations minus the total of the space used for other purposes equals more than 1800 sq ft. For example: a warehouse 200' x 1025' has a gross area of 205,000 sq ft of storage space, of which 209 sq ft are shown in the "Space Used for Other Purposes" as administrative and 209 sq ft as office space, totaling 418 gross sq ft. Thus:

200' x 1025'	=	205,000 sq ft
Less 209' + 209'	=	418 sq ft
give gross space for storage operation	=	204,582 sq ft

The "Type of Space" section will contain entries describing the space, and the total of the figures shown in the column marked "Gross" will be 204,582 sq ft. An igloo or magazine will be considered as an individual storage unit. Unimproved open storage area plots will only be considered as individual storage units when occupied. The following is a detailed instruction for completing NavSandA Form 605.

(1) Report symbol (upper right-hand corner). Enter Marine Corps report symbol "DN-4450-3."

(2) Installation (name and location). Enter complete name of the Marine Corps activity.

(3) N.D. (naval district). Enter the appropriate naval district.

(4) Storage Unit No. Enter the official building number or open storage number of the storage unit.

(5) Classification of Unit. Indicate here whether the unit is a warehouse, nonwarehouse, or open improved area.

(6) Location. Enter the word "Station."

(7) Yr built. Enter the year in which construction was completed.

(8) Condition. Indicate here the condition of the unit, e.g., poor, fair, good, or excellent.

(9) Foundation. Enter type of material used in construction of the foundation, e.g., wood, concrete, steel, brick, or other as appropriate.

(10) Superstructure. Enter type of material used in construction, e.g., wood, concrete, steel, brick, or other as appropriate.

(11) Floor. Enter type of material used in construction of floor, e.g., wood, concrete, asphalt, or other as appropriate.

(12) Roof. Enter type of material used in construction of roof, e.g., asbestos shingling, composite strapping, or other as appropriate.

(13) Water Supply. Enter source from which water is obtained. If water is not available, enter "None."

(14) Type of Sprinkler System. Enter type of system and whether it is wet or dry. If no sprinkler system is used, enter "None."

(15) Type of Heating Plant. Enter type of heating plant utilized within the storage unit and whether it is hot-air, steam, hot-water, or other. Individual space heaters are not considered heating plants unless they provide heat for the entire storage unit.

(16) Type of Electricity. Enter type of electricity by voltage, AC or DC, and the number of cycles; for example, 120 to 220 volts, 60 cycles, AC.

(17) Owned by. Enter "Marine Corps owned."

(18) Dimension (inside).

(a) For covered space, enter the inside measurements between exterior walls. DO NOT deduct space for firewalls or other structural loss.

(b) For open improved space, enter overall measurements of the open space. DO NOT deduct space for trackage or permanent roads.

(19) Total Floor Area. Enter figure from Gross Space column below.

(20) Floor. Enter the floor number.

(21) Floor Load. Enter the authorized floor load capacity in pounds per square foot.

(22) Gross Space. Through utilization of internal measurements, enter the gross square feet of space available for storage operations on each floor.

(23) Ceiling Height. Enter the maximum ceiling height for each floor. For buildings with variable ceiling heights, enter each section separately.

(24) Stacking Height. Enter the maximum height to which supplies may be stored, compatible with fire regulations and good warehousing practices.

(25) Space Used for Other Purposes. Under Purpose column, enter a brief specific description of the function for which space is used; for example, office, museum, classroom, armory, library, recreation room, and similar purposes. Under Gross Square Feet column, enter the number of gross sq ft involved.

(26) Gross Square Feet For Storage Operations. Enter the gross square feet of space which is used for any operation concerning storage or storage support. This figure should be reflected in, and equal to, the totals reported on DD form 805, line 2, columns "b" through "n."

(27) Type of space. Enter information indicating that the type of space is general, heavy-duty, heated, unheated, controlled humidity, chill, freeze, fire lane, or other as appropriate. Enter the type of material used in the surfacing of an open improved area.

(28) Stationary Materials Handling Equipment. Enter total number of units of stationary materials handling equipment located in each storage unit, by type and operation.

(29) Transportation Facilities. Enter type of transportation facility available or the capacity, location, or loading levels of the facility.

WAREHOUSING OPERATIONS

Lesson 2

Storage Space

STUDY ASSIGNMENT: MCI 30.3h, Warehousing Operations, chap 2.

LESSON OBJECTIVE: Upon successful completion of this lesson you will be able to identify the location numbering used in warehousing; determine space requirements by use of square, weight, and cube computations; complete forms used for space reporting; and identify types of vacant space encountered in space reporting.

WRITTEN ASSIGNMENT:

A. Multiple Choice: Select the ONE answer which BEST completes the statement or answers the question. After the corresponding number on the answer sheet, blacken the appropriate circle.

Value: 1 point each

1. How many factors are there to be taken into consideration when planning a warehouse storage layout?

   a. 1
   b. 2
   c. 3
   d. 4

2. How many standard small 1-compartment shelf boxes fit each shelf in bin storage?

   a. 4
   b. 8
   c. 12
   d. 16

3. The first character of the location numbering system designates the

   a. area.
   b. station.
   c. aisle.
   d. segment.

4. Which characters (circled in alternatives) in location A 22 44 17 BC designate a station?

   a. A 22 (44) 17 BC
   b. A (22) 44 17 BC
   c. A 22 44 (17) BC
   d. A 22 44 17 (BC)

5. What formula is used for finding the square feet of an area?

   a. Height x length
   b. Length x width
   c. Length x width x height
   d. Height x width

6. How many square feet of space are needed to store a box that is 8' long, 6' wide, and 4' high?

   a. 24
   b. 32
   c. 48
   d. 288

7. Your planograph shows a shaded area of 4 grids long and 4 grids wide. How many square feet of space does the area represent? (Remember each grid is 52" square)

   a. 150.3
   b. 256.5
   c. 300.4
   d. 300.9

8. How many cubic feet of space are required to store four crates 48" x 60" x 60" ?

   a. 256
   b. 320
   c. 365
   d. 400

9. How many cubic feet of space are needed to store a box that is 4' long, 15" wide, and 18" high?

   a. 5.0
   b. 5.5
   c. 6.0
   d. 7.5

10. How much weight can be placed in a 175 sq ft area that has a 600 pound per sq ft load capacity?

    a. 105,000lbs
    b. 105,240lbs
    c. 105,600lbs
    d. 105,650lbs

11. How many cubic feet of storage space are needed to store a crate that is 12' long, 8' wide, and 6' high?

    a. 48
    b. 72
    c. 96
    d. 576

12. What is the space utilization effectiveness when materiel is stacked to a height of 9 feet and the allowable stacking height is 15 feet?

    a. 1.6%
    b. 54%
    c. 60%
    d. 90%

13. The materiel in question 12 occupies 126,000 sq ft of space. By rewarehousing these supplies to utilize all vertical space, how much space will be required?

    a. 65,000 sq ft
    b. 75,600 sq ft
    c. 90,600 sq ft
    d. 113,400 sq ft

14. What Marine Corps order was published to provide instructions on methods of acquisition of facilities?

    a. MCO P4449.7
    b. MCO P4455.1
    c. MCO P4450.7
    d. MCO P4445.6

15. Which information should be shown on the planograph?

    a. Location of empty bins
    b. Square feet of nonstorage space
    c. Location of individual items
    d. Actual layout of space

16. Which scale is most commonly used for the planograph?

    a. 1/16" = 1'
    b. 1/16" = 2'
    c. 1/4" = 1'
    d. 1/2" = 1'

17. Where should the floor load rating be entered on a planograph?

    a. In each section
    b. In the legend
    c. Along each aisle
    d. On the overlay

18. Which areas are indicated by shading on the planograph overlay?

    a. Vacant storage
    b. Bin storage
    c. Rack storage
    d. Box pallet

19. Supply Facility Management Reports must reach HQMC (code LMM-2)

    a. no later than 30 June and 31 December.
    b. no later than 5 days after 30 June and 31 December.
    c. 10 days prior to 30 June and 31 December.
    d. no later than 15 June and 15 December.

20. Which situation causes type C potential vacant space?

a. Short spaces in front of stacks
b. Stacking to the floor load limit but not to height limit
c. Supplies removed for repairs to buildings
d. Low stacking leaving unfilled rows

21. Short vacant spaces in front of stacks is considered what kind of space?

a. Type A potential vacant
b. 100% occupied
c. Type B potential vacant
d. Type C potential vacant

22. If an item is stacked to the allowable floor load limit but to only 3/4 of the maximum height, the space on top is considered

a. 90% occupied.
b. 80% occupied.
c. 70% occupied.
d. 100% occupied.

23. Which feature of a warehouse is not computed in the total gross storage area?

a. Firewalls
b. Passageways
c. Stairwells
d. Platforms

24. By deducting the structural loss and aisle space from the gross space for storage, you obtain the

a. net storage space.
b. net space for storage operations.
c. net vacant space.
d. gross space for storage operations.

25. In measuring warehouse space, you measure the inside dimension and multiply the length X width to obtain the gross

a. storage area.
b. space for storage operations.
c. space for support of storage functions.
d. space for storage.

26. Which is one of the features considered as "gross space for storage operations" ?

a. Assembly
b. Packing and crating
c. Preservation and packaging
d. Structural loss

27. Action should be taken to reclaim the potential vacant space when that vacant space reaches_____percent.

a. 2
b. 3
c. 5
d. 7

28. You have an area of 135,000 gross square feet of covered storage space. How often must you submit a Supply Facility Management Report to the Naval Supply Systems Command?

a. Monthly
b. Quarterly
c. Semiannually
d. Annually

29. Which form is used as a one-time or change-in-situation report?

a. DD Form 605
b. DD Form 825
c. NavSandA Form 605
d. DD Form 826

30. Which form is used as a storage unit report?

a. DD Form 805 (Navy format/worksheet)
b. DD Form 825
c. DD Form 826
d. NavSandA Form 605

31. In preparing the Storage Unit Report, what dimensions are reported for open improved space?

a. Overall dimensions of the open space
b. Overall dimensions minus railroad tracks
c. Overall dimensions minus permanent roads
d. Overall dimensions minus railroad tracks and service aisles

32. Which feature of a warehouse is indicated on NavSandA Form 605?

a. Floor load limit
b. Width of loading platforms
c. Size of door openings
d. Fire-resistance ratings of firewalls

33. Newly activated activities with more than 20,000 gross square feet commence supply facility management reporting to Naval Supply Systems Command

a. within 10 days after activation.
b. thirty days after date of activation.
c. fifteen days prior to effective date of activation.
d. as of 30 June or 31 December following activation.

34. Which report is the Navy format/worksheet for DD Form 805?

a. Supply Facility Management Report
b. Storage Unit Report
c. Warehouse Workload Summary
d. Storage Space Status Report

35. Storage space that is unsafe for any storage purpose or operation is reported on the Navy format/worksheet DD Form 805 on line

a. 2.
b. 3.
c. 6.
d. 8a.

Note: Questions 36 to 41 pertain to the following situation:

SITUATION: Supplies of a particular category are stored within a 39' x 44' section. Supplies can be stored to 15' throughout. However, the average stacking height of stored supplies is 13'. The supply items presently occupy 1500 sq ft of space.

36. How many square feet of space is in this section?

a. 1716
b. 1706
c. 1661
d. 1500

37. How many cubic feet of storage space do the supplies occupy?

a. 17,160
b. 19,500
c. 19,550
d. 19,600

38. What percentage of space is effectively utilized?

a. 72%
b. 75%
c. 78%
d. 81%

39. If these supplies were stored to maximum height, how many square feet of space would be needed?

a. 1512
b. 1500
c. 1251
d. 1215

40. If the floor load rating is 500 pounds per sq ft, how many pounds of supplies can be stored in this section? (Remember: room dimension - 39' x 44')

a. 85,800
b. 800,000
c. 808,000
d. 858,000

41. If supplies were stored to a height of 16 ft, how many cubic feet of material could be stored in this section?

a. 27,456
b. 27,654
c. 28,546
d. 29,645

Note: Questions 42 to 46 pertains to the following situation:

SITUATION: The warehouse section shown (in fig 1 below) is 200' long and 200' wide. There are two aisles 12' wide and three rows 12' wide. The office space occupies an area 36' by 48'.

42. The office space occupies

a. 1728 sq ft.
b. 6800 sq ft.
c. 10,784 sq ft.
d. 27,488 sq ft.

43. The aisles (including intersections) occupy

a. 1760 sq ft.
b. 4800 sq ft.
c. 6800 sq ft.
d. 10,784 sq ft.

44. Including intersections, how many square feet are occupied by the rows?

a. 1728
b. 3600
c. 4800
d. 7200

Note: Insure that you calculate the square feet of the intersections only once for questions 45 and 46.

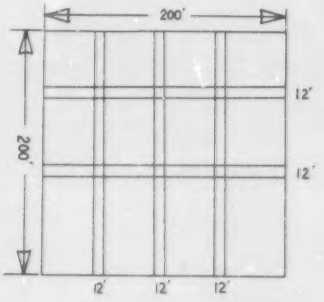


Fig 1

45. The total amount of space (excluding intersections) occupied by all aisles and rows is

a. 9,600 sq ft.
b. 11,136 sq ft.
c. 11,568 sq ft.
d. 12,000 sq ft.

46. The total amount of space (excluding aisles, rows and office space) available for storage is

a. 1728 sq ft.
b. 10,784 sq ft.
c. 12,864 sq ft.
d. 27,136 sq ft.

Total Points: 46

* * *

Chapter 3

MATERIALS HANDLING OPERATIONS

3-1. INTRODUCTION

Up to this point in the course, you have been concerned primarily with methods of planning and controlling storage areas. In this chapter you will study the physical handling of supplies, including:

a. Selection and utilization of materiel handling equipment (MHE).

b. Computing pallet requirements.

c. Principles of loading rail freight cars, trucks, and trailers.

3-2. MATERIALS HANDLING FACTORS

a. The term "materials handling" refers to the movement of the materiel and supplies from one place to another without affecting their value or performing any productive operation. The quantity of items moved plus the general size and weight visually dictates the method of handling materials. The number of pieces to be moved determines the method of handling. Regardless of the size, shape, or value of an item to be moved, the first question to be answered before selection of method of moving is, "How many pieces are to be moved?" Materials handling practices vary; however, the basic principles remain constant. Equipment should be selected so that flexibility is the keynote. Emphasis must be given to the flexibility with which equipment can be converted to handle other jobs. To be effective, planning of activities must be coordinated and all factors must be considered. Below are listed a few of the factors to be considered:

(1) Protection against weather. Care must be taken that supplies are protected against all the elements of nature.

(2) Protection against breakage. Determine the degree of care that must be taken to protect material that will be damaged by rough handling.

(3) Legal and physical restrictions in reference to transportation. Be able to off-load material as soon as possible to defray additional carrier charges.

(4) Possibility of unitized loads. Determine the best possible load limit for the equipment involved. Equipment capacities should never be exceeded.

(5) Standardization of equipment and methods. Use a standard method of moving material and equipment for the greatest reduction of cost per man-hour.

(6) Safety hazard involved. Are the laborers protected against injury? Consider all safety factors of good warehousing practices and safe handling.

(7) Distance and number of moves and materials should be kept to a minimum. Movement paths of material should be studied for the possibility of reducing "backtracking" and length of moves which will result in better utilization of equipment and personnel.

(8) All materials handling operations should be analyzed for possible improvement by elimination, combination, or simplification. Combining operations may result in simplifying and reducing the number of times that the material has to be handled, thus reducing the cost.

(9) Selection of materiel handling equipment is based on economics. These economics are measured primarily in cost of moving the materials. Greater payloads for each handling operation will result in less handling cost per price.

(10) Straight-line flow. The shortest distance between two points is a straight line. Time required to travel a given distance is reduced by following a straight line. Handle materiel as few times as possible so that the travel approaches a straight line.

(11) Wherever practicable, materials should be prepositioned for the handling operations. Consideration should be given to prepositioning moves that put containers in a position to facilitate picking up and placing them on a conveyor in such a manner as to reduce accidents and lessen equipment damage. Placing equipment so as not to obstruct other material movement will result in reduced material and equipment damage and a reduction in the number of accidents.

(12) Wherever practicable, materials should be moved in a horizontal plane or with the aid of gravity. When loading and unloading, personnel will have to reach either down or up; frequently excessive effort is used which might have been greatly reduced if the work-place layout had been better planned. The ideal lifting position is at the waist; the nearer to the waist that a container or part can be picked up and disposed of, the greater will be the efficiency.

b. Since the major portion of personnel in materials handling is engaged in loading and unloading activities, it is important that these two functions be given a great deal of consideration. Loading and unloading activities include the necessary operations to handle or transfer the many kinds of materials to or from various carriers. Where volume, size, or weight merit, mechanical handling devices can be used economically. Such devices as conveyors, industrial trucks, cranes, etc., aid the loading and unloading activity and the warehouse operations. Safety hazards can be reduced and protection increased when mechanical devices are used in place of personnel. The use of conveyors will aid in the loading or unloading operations. In selecting mechanical handling equipment, you should consider the equipment that is readily available to you. As a supervisor, you will need to know the capabilities of the equipment available for use in warehousing.

3-3. MATERIEL HANDLING EQUIPMENT

a. Introduction. The equipment discussed in this paragraph represents a few pieces of materiel handling equipment used within the Marine Corps. These are not all inclusive, but rather a general selection of the equipment used in warehousing. Your selection of equipment will vary depending on the activity where you are assigned. Figure 3-1 will display a picture of the materiel handling equipment discussed in paragraphs b through h following.

b. Forklift trucks. A forklift truck is a vehicle designed to pick up, carry, and stack unit loads of supplies and equipment. Standard forklift trucks are available with lifting capabilities of 2,000 to 15,000 lbs and lifting heights from 100 to 210 inches. The trucks are equipped with telescopic masts that permit loads to be lifted beyond the height of the collasped mast. Gasoline-powered forklift trucks may be equipped with solid rubber or semisolid tires for use in warehouses or pneumatic tires for use in outdoor storage areas. Electric-powered forklift trucks are equipped with solid rubber or semisolid (or cushion) tires for indoor operation only.

(1) Truck, forklift, 2,000-pound. This truck has the capacity of lifting 2,000 lb, with a lifting height capacity of 100 or 127 inches depending on the model. The standard operating aisle for this truck is 9'6" with a 40" load length.

(2) Truck, forklift, 4,000-pound. This truck has a lifting height capacity of 100, 127, or 144 inches depending on the model. The weight capacity is 4,000 lb and it requires a standard operating aisle of 10' in width with a 40" load length. This truck is designed in two types, one for indoor use and the other for outdoor use.

(3) Truck, forklift, 6,000-pound. This truck requires a standard operating aisle 11'6" wide with a 40" load length. It has lifting height capacity of 168 inches with a 6,000 lb load capacity. It is designed for indoor and outdoor use depending on the model.

(4) Truck, forklift, 15,000-pound. This truck is capable of lifting 15,000 lb and it has a lifting height of 210 inches. It is designed for heavy-duty outdoor storage operation and can be used with fork extensions, bar and hoist, or other attachments.

(5) Truck, forklift, rough-terrain. The standard rough-terrain forklift truck is available in three load capacities, 4,000, 6,000, and 10,000 pounds. It has high flotation tires for operation in deep sand, snow, ice, or mud and is used primarily for loading and unloading flatbed trailers, landing craft, or other similar small cargo vessels.

c. Warehouse tractor. A warehouse tractor is a powered vehicle designed to pull a train of warehouse trailers. The type designed for outdoor use has a rated drawbar pull of 2,600 to 7,500 pounds. The type designed for indoor use only has a drawbar pull of 2,000 to 4,000 pounds. Regardless of the size, this truck is of great value when used in conjunction with forklift trucks because they provide for mechanized loading, transporting, stacking, and warehousing of supplies. Tractors should be used when supplies are to be moved in excess of a 400-ft distance.

d. Warehouse crane truck. The warehouse crane truck is used to lift, swing, and lower loads that are too heavy, bulky, or otherwise unsuitable for handling by other types of materiel handling equipment. Cranes designed for outdoor use have a lifting capacity of 6,000 to 20,000 pounds. The indoor warehouse crane has a capacity to lift 6,000 to 10,000 pounds.

e. Tiering truck (narrow-aisle). The tiering truck is of straddle arm design and can generally operate in 6-foot aisles. The standard tiering truck for military use is the 3,000 lb load capacity with a lifting height of 100 or 130 inches.

f. Pallet-type handlift truck. The pallet type handlift truck is available in two distinct designs for the military service; the hand operated, hand propelled model and the hand operated, electric powered model.

g. Warehouse trailers. A warehouse trailer is a load-carrying platform mounted on casters or wheels. Standard trailers are available in a wide variety of sizes and capacities and may be equipped with solid-rubber or pneumatic tires. The ones most common in the Marine Corps are available in capacities of 4,000 to 20,000 pounds.

h. Handtrucks, dolly trucks, and conveyors. The handtruck is useful in storage operations for those places that are not accessible to machines. The dolly truck is a frame mounted on wheels or rollers used for moving heavy loads for short distances. They conveyor is a device for moving supplies in a fixed line of travel.

3-4. STORAGE ACCESSORIES AND AIDS

a. General. Special devices, accessories, and attachments have been designed to handle materials in situations where conventional items of equipment are not adequate for efficient operation. We will not attempt to include all accessories and aids used by the military services. Application and utilization of storage accessories and aids are subject to the judgement and approval of responsible authorities.

b. Pallet accessories. Pallet accessories consist of cylinder collar dunnage, notched spacers for cylinders, picture frames, pallet racks, pallet slings and safety pallets.

(1) Cylinder dunnage and notched spacers are used for palletizing of cylinders. Cylinder collar dunnage (fig 3-2) allows cylinders to be stored vertically and provides a support for the next tier without placing any weight on the heads of the cylinders. The notched spacers (fig 3-3) allow material to be stored horizontally without rolling off and provide a base for the next tier.

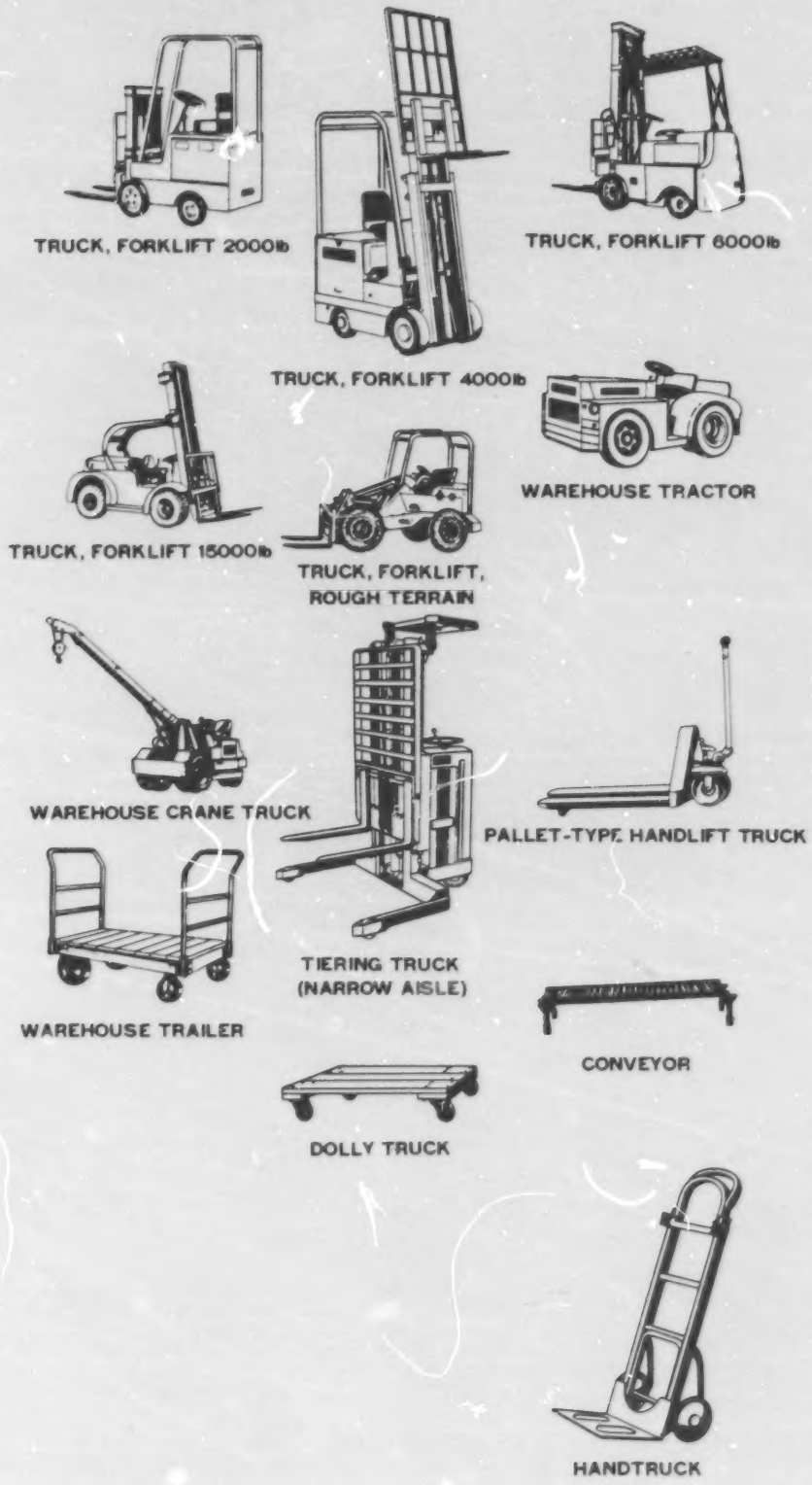


Fig 3-1. Materials handling equipment.

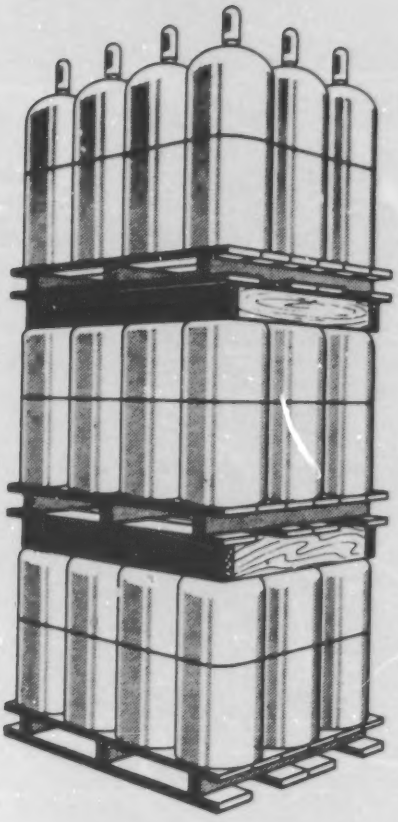


Fig 3-2. Cylinder collar dunnage.

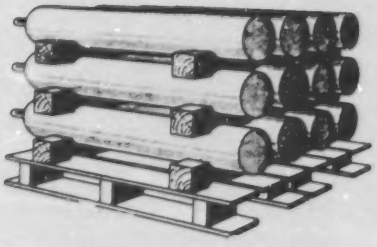


Fig 3-3. Notched spacers for cylinders.

(2) The picture frame (fig 3-4) and box pallet (fig 3-5) are used to restrain bulky material from slipping from the pallet. The box pallet is very useful in storage of small boxed items.

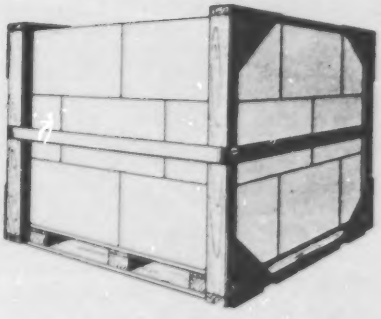


Fig 3-4. Picture frame.

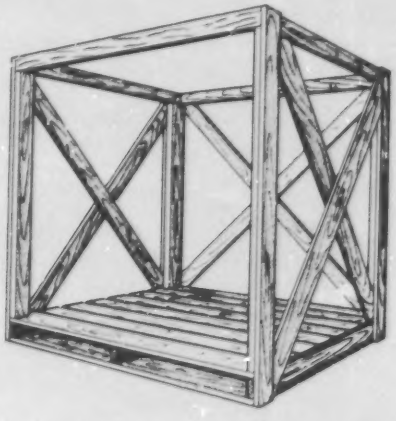


Fig 3-5. Box pallet.

c. Special storage aids. These range in variety from fork extensions to the railroad boxcar door opener. The types of aids available to you will depend on the type of activity you may be assigned as a warehouseman. You can find more detailed information on storage aids in chapter IV of DOD 4145.19-R-1.

3-5. MATERIEL HANDLING EQUIPMENT (MHE) AND PALLET REQUIREMENTS

To fully utilize the available materiel handling equipment, you must know how much equipment you will need. In operations involving mechanical handling of material, it is frequently profitable to have the equipment set the pace. There are several factors that influence the selection and use of equipment. After the required quantity and type of equipment is selected to perform a storage operation, the manpower requirement can readily be determined and adjusted. However, determination of requirements for mechanical equipment will require a great deal of study if materials handling is to be accomplished economically.

a. Factors affecting equipment requirements. There are several factors which have a direct bearing on computation of materiel handling equipment requirements. To ignore any one element could seriously impair the overall effectiveness of a planning program.

(1) Physical layout. Terrain features, location, arrangement and design characteristics of buildings, extent of open storage areas, and road and rail facilities are all elements that come under the general heading of physical layout. Each element is required in planning requirements for MHE. Physical layout will influence the type of equipment you select.

(2) Mission. Requirements are influenced by the mission which dictates material movement patterns. For example, the responsibilities of the mission determine the characteristics of commodities to be handled and thus would also determine the types of handling equipment.

(3) Workload. This factor influences quantitative requirements (numbers of pieces of equipment) to a much greater degree than it influences type of equipment. An increase in workload will, in almost all instances, result in increased equipment requirements; a decreased workload, the opposite. It must be understood, however, that the percent of decrease or increase in workload will not result in the same percent decrease or increase in MHE requirements. For example, an increase of 100% in workload does not demand that your equipment fleet be doubled. It is generally conceded that equipment efficiency increases with increased workload until the maximum potential is attained. To take another approach, an increased workload will result in an:

(a) Increase in the number of hours actual equipment usage.

(b) Increase in equipment trips per hour.

(c) Increase in payload per trip. Continuous multiple-shift operations can also influence quantitative requirements. However, requirements would not be increased simply on the basis of working more than one shift since each shift will be subject to the same general operating conditions and equipment utilization factors.

b. Determination of materiel handling equipment and pallet requirements. Effective planning of a materials handling operation, including the projecting of equipment requirements, can be accomplished only when certain prerequisites or "must" factors are considered.

(1) Volume. The first prerequisite in operational planning is an understanding of the size of the job to be accomplished. The weight, cube, packaging characteristics, mode of transportation, etc., are valuable information in evaluating materials handling operations. Anytime that an operational plan must be modified or interrupted while in progress, the cost of the operation is increased. Careful consideration and planning in the beginning should normally preclude the necessity for adjustments.

(2) Types and characteristics of equipment. A knowledge of the types of equipment and their varied characteristics so as to be able to "match the equipment to the job" is the supervisor's responsibility.

(3) Balanced operation. Unless the proper ratio of manpower and equipment is predetermined for an operation, nonproductive waste time at certain stages will result. Should one segment of an operation move at a faster pace than another, action must be taken to equalize or balance these segments so that wasted equipment and/or manpower does not result. An understanding of the operation includes knowing how long it takes each man and each piece of equipment to do a given amount of work in an efficient manner. Care must be taken that speeds which equipment may operate do not exceed those allowed for safe warehousing operations. Figure 3-6 illustrates the relationship of distance traveled to time consumed by known travel speeds.

Miles per hour	Ft traveled per second	Travel time expended (Secs) 50'	100'	150'	200'	250'
2- - - - - - -	2.9	17.3	34.5	51.7	69.0	86.2
3- - - - - - -	4.4	11.4	22.7	34.1	45.6	57.0
4- - - - - - -	5.9	8.5	16.9	25.4	33.9	42.4
5- - - - - - -	7.3	6.8	13.7	20.5	27.4	34.2
6- - - - - - -	8.8	5.7	11.4	17.0	22.7	28.2
7- - - - - - -	10.3	4.9	9.7	14.6	19.4	24.4
8- - - - - - -	11.8	4.2	8.5	12.7	17.0	21.2
9- - - - - - -	13.2	3.8	7.6	11.4	15.1	18.9
10 - - - - - -	14.6	3.4	6.8	10.3	13.7	17.0
11 - - - - - -	16.1	3.1	6.2	9.3	12.4	15.5
12 - - - - - -	17.6	2.8	5.7	8.5	11.4	14.2
13 - - - - - -	19.1	2.6	5.2	7.9	10.5	13.1
14 - - - - - -	20.6	2.4	4.8	7.3	9.7	12.1
15 - - - - - -	22.0	2.3	4.5	6.8	9.1	11.4

Fig 3-6. Speed to distance traveled time study.

(4) Operating time. The time required for the materiel handling equipment to complete an operational cycle must be accurately appraised. This involves knowledge of such elements as distances from receiving or pickup points to stacking or destination points. Knowing the time factor for one complete cycle of movement of material by the selected type of equipment and the quantity of material to be moved in this cycle will permit a single arithmetic computation of quantitative requirements by application of the common formula, V/C x T - AT = R (fig 3-7). The following hypothetical operating example is presented to illustrate the value of acquiring a positive determination of how long it takes to do a certain part of a job so that it can be further used in computing equipment and manpower requirements. The 25% allowance factor is included to compensate for unforeseen operating delays or known delays such as rest periods and coffee breaks.

Example. You are shipping 420 cases of clothing which weigh 125 lb per case and whose cube is 6.3 cu ft per case. The item is stored 8 cases per 40" x 48" pallet. Storage height is four pallet loads. One forklift with operator (and one checker) and two laborers comprise the loading crew (shipment does not require marking). Nonrepetitive functions such as preparing the car for loading, placement of car plate, etc., are not included.

Solution. The solution is set in two parts, the equipment and the personnel.

Equipment: Operational Steps.	Time (minutes)
Approach storage point from traffic aisle, pick pallet load, and back out to traffic aisle.	0.68
Proceed with load to car area, 170 ft.	0.37
Enter railcar, deposit load, and back from car onto dock	0.82
Return to storage area, 170 ft	+0.31
Actual expended time	2.18
25% allowance factor for delays.	+0.55
Average performance standard per cycle	2.73
60 - 2.73 = 21.9 or 22 cycles per hour	
Personnel: Operation steps.	
Laborers discharge pallet contents into railcar.	1.78
Laborers remove empty pallet to dock area.	+0.19
Actual expended time	1.97
25% allowance factor for delays.	+0.49
Average performance standard per cycle	2.46
60 - 2.46 = 24.3 or 24 cycles per hour	

Operations analysis. On the basis of the above, the forklift truck is capable of 22 operations per hour, and the laborers are capable of discharging approximately 24 pallet loads per hour. This would be considered an extremely well-balanced operation. The slight time advantage gained by laborers is considered unimportant.

(5) Formula for computing the number of MHE necessary for separate operations. In operation A above, the requirements will be governed by recognition of: (1) the volume of the job, (2) amount that selected equipment can move per trip, (3) length of time required by equipment to accomplish a trip cycle, and (4) the allotted time to complete the job. When these factors are determined, mobile powered equipment needs may be computed by applying the formula shown in figure 3-7. This formula may be applied in computing any mobile equipment requirement within the scope of storage under any operational circumstance whether inside or outside, whether in volume or in small-operation situations. Operational application of this formula is illustrated by the problems below:

$$\text{FORMULA} - \frac{V}{C} \times T \div AT = R$$

V --Volume or size of the operation to be performed.

C - Units of volume carried per trip (pieces, pounds, etc.) by equipment.

T - Average expended time to accomplish a complete equipment trip cycle.

AT - Allotted time to do the job.

R - Equipment requirement.

Fig 3-7. Formula used in computing MHE requirements.

(a) Problem A. A situation exists at MCLB, Albany, Georgia, which requires a relocation of 4,064 pallet loads of supplies. The haul distance is 1,500 feet, and it has been determined that it takes a tractor with four trailers approximately 20 minutes to make a round trip. Time is computed on tractor picking up and dropping trailer trains at each point. Eight pallet loads are carried on each trip. There is adequate space in all areas for multiple-lift truck operation. Compute tractor requirments to complete this job in 3 days of single-shift operation (part A) and compute forklift truck requirements to keep pace with the movement (part B). Average time for truck to load train is 5.34 minutes and to unload and stack is 7.48 minutes.

Solution to part A: Formula V/C x T ÷ AT = R

V = 4,064 pallet loads
C = 8 pallet loads per trip
T = .33 hours per round trip (60 min/20min = .33)
AT = 24 hours
R = Tractor requirements
4,064 ÷ 8 = 508 trips required to move materials
508 x .33 hr = 168 hours required to move materials
168 hr ÷ 24 = R
R = 7 tractors per day

Solution to part B: Formula V/C x T ÷ AT = R

V = 7 trailer trains
C = 1 trailer train
T = 5.34 (minutes to load train)
AT = 20 (minutes per trailer train round trip)
R = Lift requirements
7/1x5.34 ÷ 20= R

37 ÷ 20 = R
R = 1 17/20 or two forklift trucks for loading
V = 7 trailer trains
C = 7.48 (minutes to unload stack)
AT = 20 (minutes per trailer train round trip)
R = Lift truck requirements

7/1x7.48 ÷ 20= R

52 ÷ 20 = R
R = 2 3/5 or 3 forklift trucks for unloading and stacking

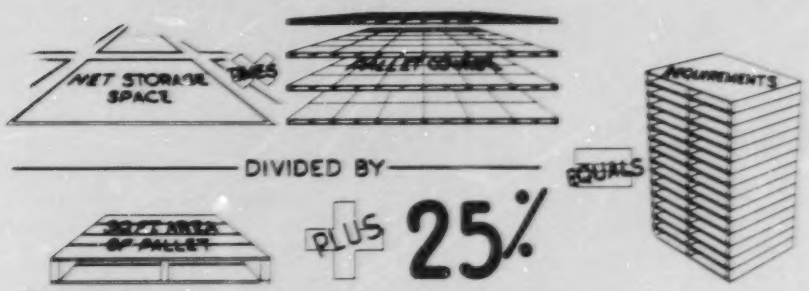
(b) Problem B. The MCLB at Barstow, Calif, has received 24 carloads of supplies that must be discharged and stored in 2 days of single shift operation. The area of receipt will accommodate large-scale activity so operating room poses no problem. Point of storage is within 200 ft of receiving dock. Received item is stored in unit loads weighing 1,860 lb; a forklift truck must make an average of 51 loads to discharge one car. Timing experience has indicated an average trip time of 2.85 minutes for each load delivery and return. No delay in car palletization is anticipated as adequate labor force has been allocated to equal pace of trucks. How many lift trucks per shift will be required to complete this operation on schedule? By using the formula V/C x T ÷ AT = R, the following solution will result:

V = 24 carloads
C = Portion of carload carried per trip = 1/51
T =2.85 minutes(time for truck to make round trip)
AT = 16 hours
R = Lift truck requirements

R = 24 - 1/51 x 2.85 (min) - 16 hr (24 - 1/51 = 24x51/1=1224)
R = 1,224 x 2.85 - 16
R = 3,488 - 16 (3,488 - 60 = 58 hr)
R = 58 - 16
R = 3 5/8 or 4 lift trucks

(6) Formula for computing pallet requirements. The first consideration in pallet requirement planning is knowing how much warehouse floor space or outside storage space is available and the amount that can be considered to represent net pallet storage area or bulk storage area. The first step is to reduce this floor area to net square feet. The second step is to determine the square foot area of the pallet. To this a 25% factor should be added to accommodate the average load overhang. A flat 16 sq ft area may be accepted for the 40"x48" pallet. Palletized unit loads should be approximately 40 inches wide, 48 inches long, and 48 inches high (including the pallet). Overhang of load on pallet must not exceed 2 inches on any side. The square foot of the pallet should then be divided into the net square feet of the storage area. The quantity is then multiplied by the number of pallet courses in vertical storage. This figure equals pallet requirements for the area. An adjustment factor may be considered for those areas wherein some supplies by virtue of their characteristics are stored without palletization. Figure 3-8 illustrates the formula for the planning of pallet requirements.

FORMULA - $\frac{S \times H}{D} = R$



EXPLANATION:

S - Net covered storage area, in square feet used for bulk storage.

H - Average stacking height in such storage areas expressed in pallet courses (pallet loads).

D - Square feet of floor area occupied by a pallet as determined by pallet size with 25% added to compensate for load overhang and clearance.

R - Quantity of pallets required.

Fig 3-8. Formula for computing pallet requirements.

Example: Storage depot X is in the process of moving supplies into storage. Depot X will possess 3,500,000 gross square feet of warehouse storage area of which 70% will be net bulk storage space. Facility and commodity characteristics indicate that an average of four pallets high storage will prevail. How many pallets are required to effect an 85% space utilization of the net bulk storage area?
S = 3,500,000 x .70 (net space) x .85 (percent occupied)

H = 4 (pallets in vertical storage)
D = 16 (Gross square feet per 40" x 48" pallet)
R = Pallet requirements (40" x 48" pallets)
3,500,000 x .70 = 2,450,000
2,450,000 x .85 = 2,082,500
2,082,500 ÷ 16 x 4 = 520,625 = R

3-6. LOADING OF RAILROAD CARS, TRUCKS, AND TRAILERS

a. Introduction. Improper loading and unloading are two of the major causes of loss and damage during transportation and the resulting delay in use at the destination. The purpose of

this paragraph is to provide guidance in loading and thereby help prevent these discrepancies during transportation by describing procedures or referring to other publications which set forth procedures to be followed by shippers and cosignees. After determination has been made to move materials and supplies, the freight Officer should be advised so that the proper mode of transportation may be selected.

b. Selection and inspection of railroad cars. Before a railroad car can be used, it must be inspected to determine if it is suitable to carry a load safely to its destination. The following points should be checked:

(1) Soundness of the floor, sidewalls, end walls, and roof.

(2) Absence of all dunnage, nails, and bolts which might cause damage to material.

(3) Condition of doors. They should open and close easily and completely.

(4) Size and type of car. Determine if you received the car that was ordered.

c. Bagged commodities in closed cars. Care must be taken when loading bagged commodities to prevent damage. Contamination and snagging of bags can be prevented by inspecting the car prior to loading. Chafing can be controlled by loading the bags away from the car wall in pyramided layers. Control of moisture damage can be accomplished by protecting the supplies from the elements while loading. Bags should not be stacked on damp platforms or damp car floors. Figure 3-9 illustrates the proper stacking of bagged commodities.

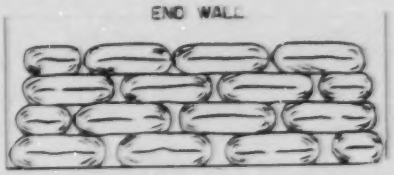


Fig 3-9. Pyramided layer buildup (side view).

d. Unit load. A unit is two or more items handled as a single unit. Unit loads are generally made up with a pallet base. When the 40" x 48" pallet is used, the ideal unit load is 48 inches high including the pallet and has a space displacement of 53 cubic feet. The weight of the material may prevent stacking to the desired 48-inch height.

(1) Nonbonded unit load. Nonbonded unit loads are items of a type or shape that can be deposited without bonding on a pallet and transported as a unit during normal handling and storage operations.

(2) Bonded unit load. Frequently, because of the type of material or items to be transported, it will be necessary to bond the items together. The items will be formed into a unit load and bonded by means of adhesive, strapping, edge protection, or other aids designed for this purpose.

e. Loading of palletized unit loads. When loading into a car, each unit must have a firm bearing contact against the adjacent unit. Pallets should be placed tightly into each end of the car. Ordinarily the space between pallets and the sidewalls of the car is approximately 6 inches and does not require any additional crosswise bracing; if that space exceeds 18 inches, then the load must be secured to prevent side shifting. If you are loading small pallets and you have space in the center exceeding 18 inches, then crosswise bracing is required. The loading at the doorway is finished off with proper bracing to secure and hold the load in place. It is desirable to completely fill the lengthwise space of the car with pallet units. When the last two pallets are moved into place, there is some slack space (possibly 4 to 12 inches) at one or both sides of the doorway pallets. When this occurs it is necessary to fill in the vacant space with some form of dunnage.

f. Loading of cylinders. Cylindrical containers have a circular contour and when loaded in a railcar, truck, van, or trailer, they do not have complete face or surface contact or support between adjacent containers, and this creates an unstable condition. Many containers in use are constructed of lightweight material that will flex, bend, or crush under pressure. It

is necessary to have at least two point contact with adjacent cylinders, to approach the ideal in loading: tight loading. Fig 3-10 illustrates this point; "d" of this figure shows the best method (tight loading), since any force against a container is distributed to adjacent containers.

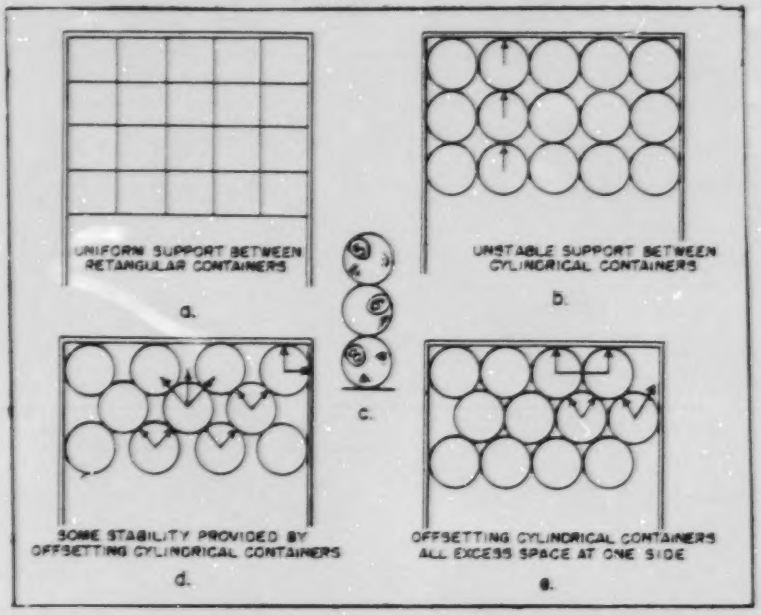


Fig 3-10. Loading diagrams of cylindrical containers (top view).

g. Pneumatic dunnage. Pneumatic dunnage units were developed primarily to occupy the void or vacant space in loaded rail, highway, or water conveyances. Pneumatic dunnage is not to be used in aircraft. If used to secure explosives or other dangerous articles, prior approval must be obtained from the Bureau of Explosives. Two types of pneumatic dunnage are available, reusable and disposable. Since there is a variation in size and shape, most commodities do not completely fill the car. There is generally a void space which must be blocked, braced, or filled. Pneumatic dunnage is a definite asset for this purpose and it is available in the sizes listed in table 3-1. Figures 3-11 and 3-12 illustrate the two types of pneumatic dunnage.

Table 3-1. Sizes of pnuematic dunnage.

	Inflated size	Deflated size	Weight (approx)
Type I (Disposable)	36" x 48" 48" x 48" 48" x 72" 48" x 96"	36" x 58" 48" x 58" 48" x 82" 48" x 106"	12 lbs 18 lbs 22 lbs 26 lbs
Type II (Reusable)	48" x 48" 48" x 72"	57½" x 57½" 57½" x 81½"	18–22 lbs 26–29 lbs

Fig 3-11. Reusable pneumatic dunnage unit complete.

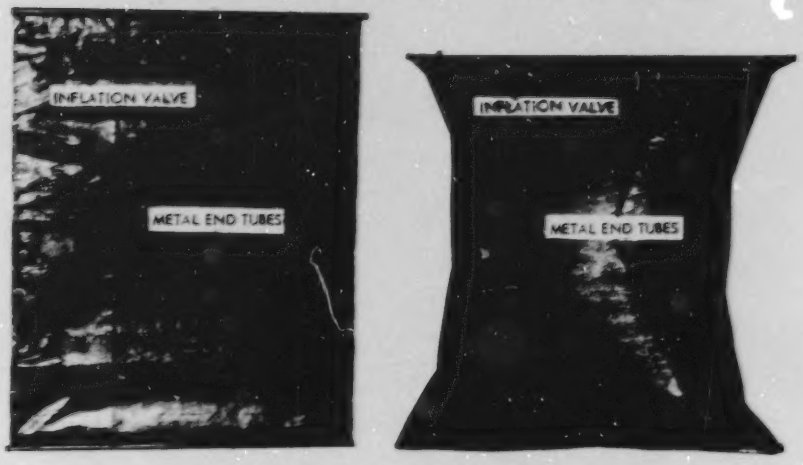


Fig 3-12. Disposable pneumatic dunnage unit complete.

(1) Advantages of using pneumatic dunnage.

(a) Allows more rapid installation and removal than conventional dunnage.

(b) Provides a highly resilient load-restraining method.

(c) Provides relatively low-pressure bracing (2 to 5 psi) for loads. (Inflation pressure for pneumatic dunnage units in truck/trailer containers must not exceed 3/4 psi maximum.)

(d) Is capable of tightening loads in which compactness was not achieved during loading.

(e) Is capable of repositioning cargo loads shifted by sudden impact and also will expand to take up slack developed through normal load jostling in transit.

(f) Is capable of retaining adequate cushioning air pressure during long-distance shipments up to 30 days.

(g) Is not seriously affected by changes in temperature and altitude encountered during surface transport.

(2) Example of pneumatic dunnage bracing (figs 3-13 through 3-15).

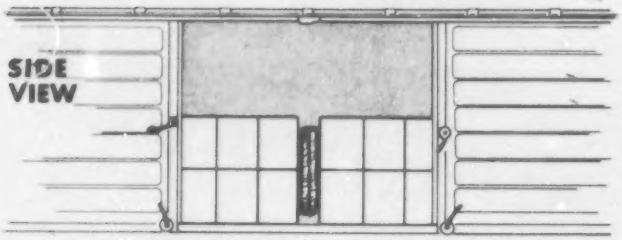


Fig 3-13. Single void pneumatic bracing.

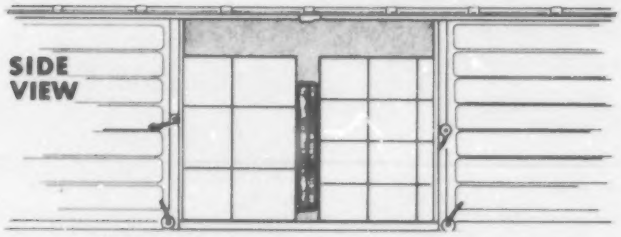


Fig 3-14. Larger dunnage units bracing higher loads.

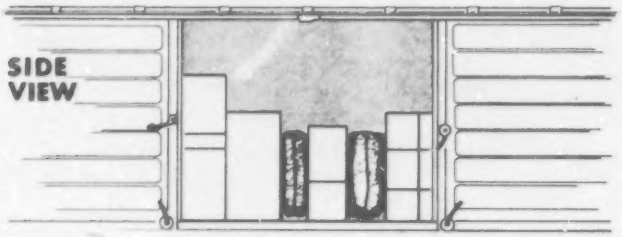
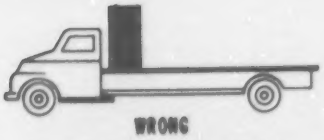


Fig 3-15. Pneumatic dunnage units staying load of various package sizes.

Note: When more than one unit of pneumatic dunnage is used in a conveyance, the inflation process should be alternated from one unit to another until all units reach desired pressures.

h. Truck and trailer loading. The most important factor contributing to the prevention of damage in truck and trailer loading is that of tight loading. Rarely does the material to be shipped fit in a closed truck, van, or trailer without side slack or end slack. Physical dimensions, capacities, weight limitations, and load distribution of trucks and trailers vary greatly. In most cases slack may be taken up with bulkheads or dunnage. The variation involved precludes covering of all types of loads. Since we cannot cover the types of various loads, we will, therefore, cover the balancing of the load aboard the vehicle. Equal distribution of load is just as important in truckloading as in carloading. Figures 3-16 and 3-17 illustrate weight distribution.



WRONG

A heavy load, like a big piece of machinery or a safe, should not be loaded against the cab. This loading will bend the frame, perhaps permanently. It will also overload the front tires, may even cause a blowout on a worn tire. Hard steering will also result, and the load may be top-heavy.

RIGHT

A heavy concentrated load should be placed near the rear and on its long side if at all possible. Most of the load should be over the rear axle to get proper tire loading and eliminate bending of the frame.

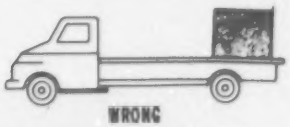
WRONG

A very heavy load should not be loaded at one side. This overloads one spring and the tires at that side. This loading could be bad enough to allow the brakes to lock on the wheels at the light side and cause flat spots on the tires, or a skid on a wet surface.

RIGHT

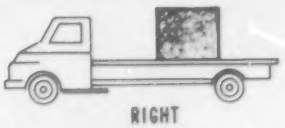
This loading has equal loads on rear tires and eliminates twisting of the frame, which might loosen rivets of cross members or frame brackets. Uniform loading crosswise prevents axle housing and wheel bearing overloading, too.

This above example applies to trucks and trailers alike.



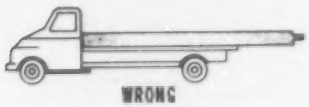
WRONG

This loading should never be permitted. The frame bends, the rear tires are very much overloaded, and enough weight is taken from the front tires to make steering almost impossible.



RIGHT

Again, the proper place for a concentrated load like this is just ahead of the rear axle, with the longest side on the floor.



WRONG

This type of loading results from the use of the wrong vehicle for the job.

RIGHT

A tractor-trailer combination is the proper vehicle for use in service like this. By using the proper vehicle, damage to the truck and tires, and even serious accidents, may be avoided.

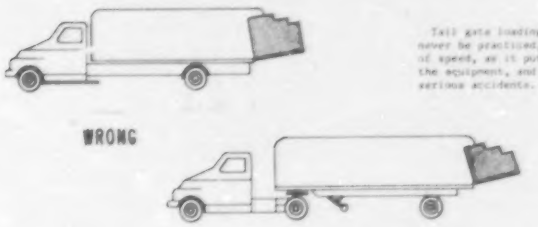
Fig 3-16. Examples of RIGHT and WRONG truck loading.

Trailers are also designed for uniform load distribution, as shown by the above sketches. The fundamental difference between loading trailers and trucks is: in the case of trucks, the average design provides for about 90% of the payload on the rear tires and 10% on the front tires. In the case of trailers, the payload should be distributed equally between the rear tires and the fifth wheel which transfers its load to the truck-tractor.

With a part load or with a very heavy load having little bulk, it is common practice to put it at the front end of the trailer to get traction on truck-tractor rear tires. This overloads the truck tires and shortens their mileage life, to say nothing of bending the truck rear axle housing. Application of trailer brakes may lock wheels, cause tire flats, spots, or skidding, or both.

The load should be distributed over the full length of the trailer floor or platform.

These examples are obviously wrong. In the case of the first trailer, the heavy load at the rear is overloading the rear trailer tires. There is practically no load on the fifth wheel, and the truck-tractor rear tires would certainly slip and wear away rubber. Braking distribution would also be very uneven.



Tail gate loading, of course, should never be practiced, even in the interest of speed, as it puts a severe strain on the equipment, and frequently results in serious accidents.

Fig 3-17. Examples of RIGHT and WRONG trailer loading.

3-7. LOADING RULES

When freight is to be loaded on or in open-top or closed cars and no loading and security methods are provided, it should be blocked and braced according to the best method or procedure that can be devised from the Association of American Railroads pamphlets. These pamphlets are usually filed in the office of the installation transportation officer. The Loading Rules Committee, Mechanical Division, Association of American Railroads, has issued a looseleaf binder containing 6 sections of rules governing the loading of commodities on open-top cars. The sections are listed by number and title as follows:

Section No.	Title
1.	General Rules
2.	Loading of Steel Products Including Pipe
3.	Loading of Road Grading, Road Making, and Farm Machinery
4.	Loading of Miscellaneous Commodities Including Machinery
5.	Loading of Forest Products
6.	Loading of Department of Defense Material

The instructions concerning the loading of ammunition, explosives and other hazardous materials are issued by the Bureau of Explosives in BOE 6000.E.

WAREHOUSING OPERATIONS

Lesson 3

Materials Handling Operations

STUDY ASSIGNMENT: MCI 30.3h, Warehousing Operations, chap 3.

LESSON OBJECTIVE: Successful completion of this lesson will enable you to identify the capabilities of materiel handling equipment; to identify the factors and principles involved in materiel handling; to compute materiel handling equipment requirements and pallet requirements; and to follow the correct procedures for loading railroad cars, trucks, and trailers.

WRITTEN ASSIGNMENT:

A. Multiple Choice: Select the ONE answer which BEST completes the statement or answers the question. After the corresponding number on the answer sheet, blacken the appropriate circle.

Value: 1 point each

1. Which factor dictates the method of handling materials?

   a. Cost of moving
   b. Value of the item
   c. Safety hazards involved
   d. Volume

2. Which piece of equipment is useful in storage for places not accessible to machines?

   a. Dolly truck
   b. Handtruck
   c. Conveyer
   d. Warehouse trailer

3. What is the rated drawbar pull for outdoor use warehouse tractors?

   a. 2,000 to 4,000 lb
   b. 2,900 to 5,000 lb
   c. 2,600 to 7,500 lb
   d. 2,600 to 8,500 lb

4. What materiel handling equipment should be used when supplies are to be moved 500 ft?

   a. Warehouse tractor
   b. Dolly truck
   c. Forklift truck
   d. Warehouse crane truck

5. Which storage aid is used for horizontal storage of cylinders?

   a. Box pallet
   b. Picture-frame pallet
   c. Collar dunnage
   d. Notched spacers

6. In your computation of materiel handling equipment requirements for a particular job, which factor will influence the quantitative requirement (number of pieces of equipment) to a greater degree than it will influence the type of equipment required?

   a. Physical layout
   b. Mission
   c. Workload
   d. Weather

7. There are 200 palletized unit loads to be shipped from your warehouse by boxcar. If 1 forklift truck can complete 1 cycle with 1 pallet in 4.17 minutes, what is the minimum amount of forklift trucks required to complete the job in 8 hours?

a. 1
b. 2
c. 3
d. 4

8. If the average performance standard per cycle is 4.29 minutes, how many cycles can be accomplished in 1 hour?

a. 12
b. 14
c. 15
d. 16

9. How many square feet are required to store a 40" x 48" pallet?

a. 4
b. 8
c. 16
d. 24

10. What percentage factor is used to compensate for the pallet load overhang?

a. 2%
b. 20%
c. 25%
d. 30%

11. Which items should be loaded in railcars in a pyramided layer buildup?

a. Cylinders
b. Bagged commodities
c. Metal pipes
d. Oil drums

12. What is the cubic feet of an ideal palletized unit load?

a. 40
b. 48
c. 53
d. 56

13. What is the height of an ideal palletized unit load?

a. 36 in
b. 40 in
c. 48 in
d. 52 in

14. When loading small pallets in a railcar, what action is taken when the vacant space in the center of the car exceeds 18 inches?

a. The space is filled with small containers.
b. Crosswire bracing is required to prevent pallets from shifting.
c. Secure each pallet with a snubbing device.
d. Pallets should be blocked lengthwise and crosswise.

15. Which type of dunnage is NOT authorized for use in loading aircraft?

a. Plywood
b. Fiberboard
c. Pneumatic
d. Lumber

16. What is the most important factor in loading trucks and trailers?

a. Weight
b. Dunnage
c. Tight loading
d. Distance of deliverance

17. What is the maximum inflation pressure for pneumatic dunnage used in truck/trailer containers?

a. 3/4 psi
b. 2 psi
c. 4 psi
d. 5 psi

18. What publication provides instructions for loading of ammunition, explosives and other hazardous materials?

a. 80E 6000.F
b. 80E 6000.H
c. 80E 6000.E
d. 80E 6000.J

19. Which pamphlet of instructions is issued by the Association of American Railroads?

a. Loading of Projectiles
b. Bracing Less than Trailer Loads of Explosives
c. Bracing Carloads of Dangerous Articles
d. Loading of Department of Defense Material

Note: Questions 20 to 28 require you to identify the appropriate equipment (a-e below) to which the respective characteristics apply.

a. Forklift truck, 2,000-pound
b. Forklift truck, 4,000-pound
c. Forklift truck, 6,000-pound
d. Narrow-aisle tiering truck
e. Forklift truck, rough-terrain

20. Requires a standard operating aisle of 9'6" with a 40" load length.

21. Requires a standard operating aisle of 10' with a 40" load length.

22. Requires a standard operating aisle of 11'6" with a 40" load length.

23. Has a lifting height capacity of 168 inches.

24. Has a load capacity of 3,000 pounds.

25. Is a straddle arm design and can be operated in an aisle 6' in width.

26. Has a lifting height capacity of 100, 127, or 144 inches (depending on the model).

27. Has a lifting height of 100 or 130 inches (depending on the model).

28. Has a load capacity of 10,000 pounds and is used for operation in deep sand or snow.

Note: Questions 29 to 32 pertain to situation I.

SITUATION I: You are a warehouse supervisor and information has been received showing that a large quantity of a single item is due in. Current stock of this item on hand is in packages weighing 72 pounds each, with 21 packages per 40" x 48" pallet. When received, inbound stock will be packaged in a similar manner. The storage point is 100 feet from the expected unloading point. You assign two men to palletize and one 2,000-pound forklift truck to move and stack the pallets. When the operation is completed, a time study of this operation showed: (25% delay factor is included)

Total time per cycle to palletize . . . . . 4.80 min
Total time per forklift cycle . . . . . 2.40 min
Total pallet loads 600

29. How many cycles did the forklift truck complete per hour?

a. 8
b. 12
c. 25
d. 26

30. How many cycles did the laborers complete per hour?

a. 8
b. 12
c. 25
d. 26

31. If the forklift truck moved 1 pallet load per cycle, how many forklift trucks would be required to move these supplies in 8 hours?

a. 1
b. 2
c. 3
d. 6

32. What does the analysis of this operation reveal?

a. It was well balanced.
b. One additional laborer should have been added.
c. Two additional laborers should have been added.
d. One additional forklift truck should have been added.

Note: Questions 33 to 35 pertain to situation II.

SITUATION II: You must move 1,152 pallets of supplies indoors. You want to concentrate sufficient equipment to complete the operation in 2 workdays (16 hours total). Previous time studies reveal that:

(a) It requires 5.00 minutes for the outdoor forklift to load the train (3 trailers with 2 pallets on each).

(b) The tractor-trailer train can make the round trip in 20 minutes. (The tractor picks up and drops trailer trains at each point.)

(c) The indoor forklift truck can unload the train and stack the supplies in 8.00 minutes.

(d) Remember the formula: $V/C \times T \div AT = R$.

33. How many tractors will be required for this 2-day operation?

a. 2
b. 3
c. 4
d. 5

34. How many outdoor forklift trucks will be needed to support the tractor-trailer trains?

a. 1
b. 2
c. 3
d. 4

35. How many indoor forklift trucks will be needed to support the tractor-trailer trains?

a. 2
b. 3
c. 4
d. 5

Note: Questions 36 to 38 pertain to situation III.

SITUATION III. You have been requested to report the approximate number of 40" x 48" pallets being used and the number of the same-size pallets required to fill all vacant storage space in one section of your warehouse. The following information is available:

Total area (200' x 200')	40,000 sq ft
Space occupied by aisles	9,525 sq ft
Space occupied by columns	112 sq ft
Space occupied by material on pallets	4,150 sq ft
Vacant space available for storage	26,213 sq ft
Average stacking height	4 pallets

36. Approximately how many 40" x 48" pallets are there in the storage section?

a. 2,500
b. 2,408
c. 2,036
d. 1,037

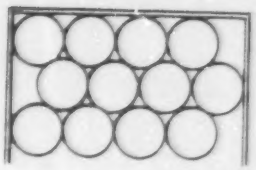
37. How many pallets will it take to store supplies 4 pallets high in the vacant storage space?

a. 4,896
b. 5,240
c. 5,880
d. 6,553

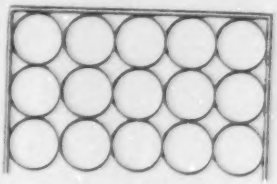
38. How many pallets will it take to store supplies in 75% of the vacant space?

a. 1,640
b. 4,916
c. 5,526
d. 5,555

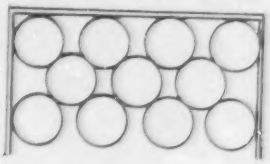
39. Which diagram below depicts the best method for loading cylindrical containers in a boxcar?



a.



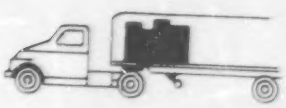
b.



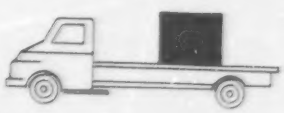
c.

40. Each truck illustrated below has been loaded with a different commodity. The supplies in each instance are heavy and no more items are to be placed on trucks. On which truck have the supplies been properly placed?

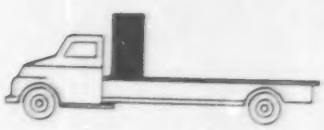
a.



c.



b.



Total Points: 40

* * *

Chapter 4

STORAGE PROCEDURES

Section I. RECEIVING

4-1. INTRODUCTION

The receiving operation is the method by which supplies are brought into the military supply system. Prompt and accurate processing of receipts is a prime requisite for effective warehousing. The details of receiving operations depend mostly on the types of supplies to be handled, distance supplies must be moved, types of materials handling equipment available, and physical characteristics of the storage installation. However, the following basic principles of receiving are applicable wherever supplies are received for storage, issue, shipment, or distribution.

4-2. PLANNING THE OPERATION AND SOURCES OF INFORMATION

a. Planning. The planning of receiving operations requires full coordination among the offices of the storage installation responsible for different phases of the operation. This is accomplished by the proper evaluation of information received in advance of actual shipment to insure that proper steps are taken to receive the supplies as efficiently and economically as possible. All available information regarding receipts must be disseminated throughout the storage and materials handling organization, which includes personnel concerned with warehousing, transportation, preservation, packaging and packing, inspection, etc. This information will inform you when the shipment is due to arrive, how much is being received, what type of supplies are involved, and the mode of transportation being employed. From this information, every effort should be made to maintain a balanced operation with minimum interference with other storage and materials handling activities. With the proper evaluation of this information the warehouse supervisor can gain:

(1) Effective utilization of space. This will allow you to use vertical space to the fullest extent and plan the amount of square feet required to store the inbound shipment. Height to which material can be stored will indicate the cubic feet requirement of the shipment.

(2) Proper assignment of labor and equipment. As soon as requirements are determined, submit requests to central labor and equipment pools. Make sure the manpower and equipment are in balance.

(3) Determination of shipments requiring special handling. Shipments of certain subsistence items require inspection prior to storage by veterinarian personnel.

b. Sources of information. You may be thinking "How is it possible to plan a receiving operation in advance of the actual receipt of the materiel?" This is accomplished by advance information as stated in the previous paragraph. There are various sources of advance information available to the warehouse supervisor:

(1) Advance copies of shipping documents.

(2) Advance copies of bills of lading.

(3) Due-in information contained in the receipt "from due" card.

(4) Copies of contracts and purchase orders.

(5) Dispatches.

(6) Wire, note or letter notices of shipment.

(7) Other miscellaneous notices from vendors or carriers.

4-2. SPOTTING THE CARRIER AND UNLOADING

a. Spotting the carrier. This is the process of locating a railcar or truck in the proper place for unloading. When information is received by the warehouse unit that a carrier is due to arrive, the unloading site must be established. In making such a decision, the warehouse supervisor must know what quantity of supplies he is dealing with, what Federal groups are involved, and how many items are in the shipment. When possible the carrier should be spotted where supplies can be moved in a straight-line flow directly into the warehouse or storage area.

b. Pre-unloading considerations. After the carrier is spotted and before actual unloading of the supplies begins, there are certain steps that should be followed.

(1) Flagging the traffic end of the railcar. The traffic end of the railcar is flagged or marked in such a manner as to prevent unscheduled contact with the car by other rail equipment while unloading operations are in progress.

(2) Set brakes on railcar or block wheels of trailers.

(3) Check car or truck seals. Make sure that they are intact and their numbers agree with those on receiving documents (bills of lading, notices of shipment, advance copies of shipping orders, etc.).

(a) If there is no advance copy of a delivery document available, the seal number may be verified after the car or truck has been opened. This information is obtained from documents which accompany the shipment.

(b) If the seal is broken or missing, or if the numbers do not agree with those on the documents, appropriate notations should be made on the receiving document.

(4) Open car or truck doors.

(a) Railcar doors must be opened by the transportation personnel. Doors should be opened with extreme care so as to protect personnel from falling cargo packages. If doors are jammed or otherwise incapable of being opened manually, a mechanical aid should be employed.

(b) Truck doors are opened by the truckdriver.

(5) Visually inspect containers within the car or truck. Examine containers to determine the degree of damage incurred during travel, if any. This is necessary in order to plan for inspection of contents of damaged containers by the claims officer, transportation officials, or claim agents of the carrier.

(6) Determine method of entry. The method of entry into truck or railcar depends on the type of carrier and physical characteristics of the receiving area.

(a) If the unloading is to be accomplished on a warehouse platform, a bridge plate may be used between the platform and the truck or railcar door.

(b) If the receiving platform is at ground level, a portable platform or a forklift truck may be employed.

c. Methods of unloading. Methods used in the unloading of supplies differ with the type of supplies involved. Certain basic principles are common and efficient when properly used.

(1) Straight-line flow. Straight-line flow can be obtained through proper spotting of the carrier's equipment so that a minimum of turns will be necessary from the vehicle to the stock location.

(2) Continuous flow. Continuous flow results from maintaining the proper balance of labor and equipment. Lost motion and waiting time must be held to a minimum.

(3) Concentration of operation. The unloading operation should be localized insofar as possible to make supervision easier and, through the use of shorter hauls, reduce requirements for materials handling equipment.

(4) Efficient handling. This is normally accomplished by handling containers only once, palletizing supplies to the maximum extent practical and using materials handling equipment whenever possible.

d. Unloading mixed shipments. When a shipment consisting of several items is received, it is necessary to check for item identification, markings, and quantities on each container. Conveyors are useful in unloading this type of shipment.

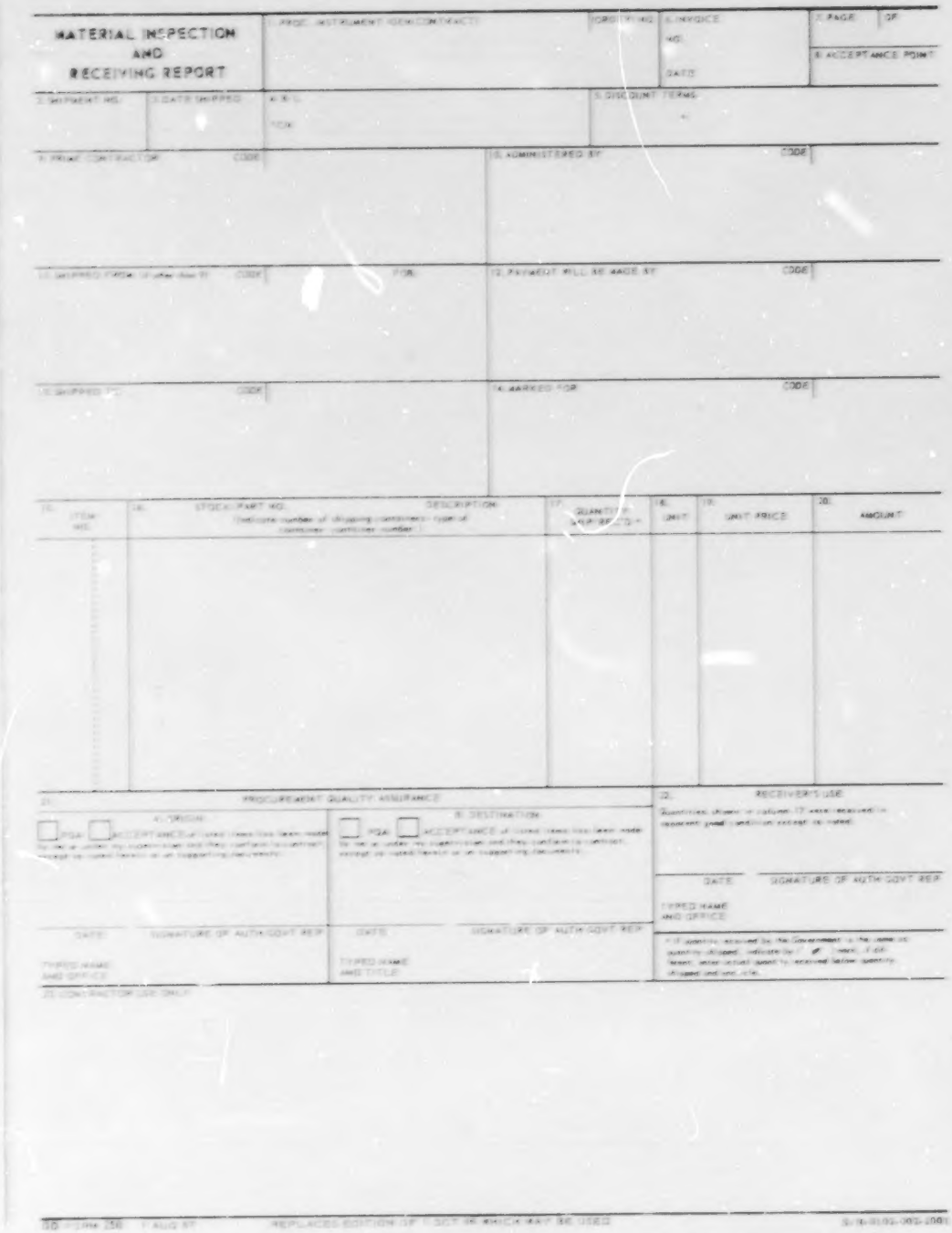
e. Unloading carload shipments of single-line items. If material is in unit loads, it can be moved directly from the truck or car to the location for the items, depending on the distance involved. Regardless of whether the shipment is mixed or single-line item, unit pallet loads should be made prior to moving the supplies to storage. Pallet selection guides and charts should be displayed near the unloading area for reference in determining the most suitable pattern for various sizes of containers. The size of the unit pallet load will be determined by:

(1) Protection of personnel.

(2) Consideration of container strength.

(3) Size of door and capacity of equipment.

f. Tallying incoming supplies. Checkers will normally be assigned from the transportation unit. In most operations, the forklift operator will be utilized as the checker. The checkers will record only the quantities actually unloaded and accounted for when tallying the total quantity of an item. In many cases, items packed in uniform quantities can be checked by the pallet load by forklift operators while unloading the shipment. When containers are received which contain a standard quantity, it is generally not necessary to open them unless they have been tampered with or show visual evidence of damage. Shipments consisting of numerous different-sized packs or various different items and quantities must be checked and identified by stock number, unit of issue, nomenclature, quantity per box or carton, and number of cartons per unit load. The available shipping document is generally used as the tally sheet. For receipts from commercial sources that are inspected and accepted at origin, the shipping document will normally be the DD Form 250 completed by the inspector and used by the checker for tallying of supplies. Supplies received without covering documents must be tallied on forms designated by local command. Figure 4-1 and 4-2 illustrate two forms commonly used for tallying of supplies.



MATERIAL INSPECTION AND RECEIVING REPORT

CONSIGNEE'S COPY - ATTACH TO SHIPMENT

Fig 4-1. Material Inspection and Receiving Report (DD Form 250).

671-6600

THE HOLLINGER CORPORATION (1)
3810 S. Four Mile Run Drive
Arlington, Virginia - 671-6600
MANUFACTURERS OF CORRUGATED BOXES
AND SET-UP METAL EDGE BOXES

SOLD TO: Contracting Officer
Marine Corps Logistic Base
Albany, Georgia

SHIP TO: Commanding General
Marine Corps Logistic Base
Albany, Georgia

(5)

Invoice No. A 3583
DATE 11/26/
(2) YOUR ORDER NO. N67004-3068
DATE ORDERED 10/23/
SALESMAN XXM
(3) DATE SHIPPED 12/26/
VIA Rail
(4) TERMS 2% 30

F.O.B. PLANT ( ) DESTINATION ( )

ITEM	QUANTITY ORDERED	QUANTITY SHIPPED	QUANTITY BACK ORDER	DESCRIPTION	UNIT PRICE	EXTENSION
1	2000	2000		Box, folding 23 1/2" x 15 1/2" x 6 3/4"	270.00M	540.00
2	4000		4000	Box, folding 23 1/2" x 15"x 15"	340.00M	
3	4000	4000		Box, folding 15 1/2" x 11 9/16" x 7 1/8"	220.00M	880.00
						1420.00

LEGEND

(1) Shows who is shipping the supplies.

(2) Reference is made to contract that ordered the supplies. This is the number that will appear on the due-in listing.

(3) Shows date shipment was made and the mode of transportation.

(4) If supplies are paid for within 30 days after being inspected and accepted, the Marine Corps will save 2% of the total billed cost. This saving is called a discount.

(5) Item number 2 is backordered and will be sent later.

MAKE CHECKS PAYABLE TO THE HOLLINGER CORPORATION.
PLEASE RECORD INVOICE NUMBER ON YOUR CHECK. PRICES
ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Fig 4-7. Example of a contractor's invoice.

g. Repacking and marking of containers. While the supplies are being unloaded, there is another process that takes place. Prior to moving supplies to storage it may be necessary to repack and mark some containers. There are several factors that can cause repacking and marking.

(1) Failure of contractors to comply with contract requirements.

(2) Changes in stock number, item identification, or other data.

(3) Change in specifications.

(4) Damaged containers unsuitable for storage. It is preferable to correct deficiencies at the time of receipt in order to prevent deterioration and rehandling of supplies at a later date. Individual items, separate containers, or pallet loads must be properly marked at the time material is checked and identified. When materials are received in palletized loads, it is not necessary to mark each individual carton or box in the load.

4-4. REPORT OF DAMAGE AND/OR IMPROPER SHIPMENT

If there is an overage loss, or damage, notation must be made on the receiving document. However, do not change the quantities shown on the document. Upon receipt of material, if discrepancies exist, the local transportation officer should be notified so that the following form can be prepared if necessary.

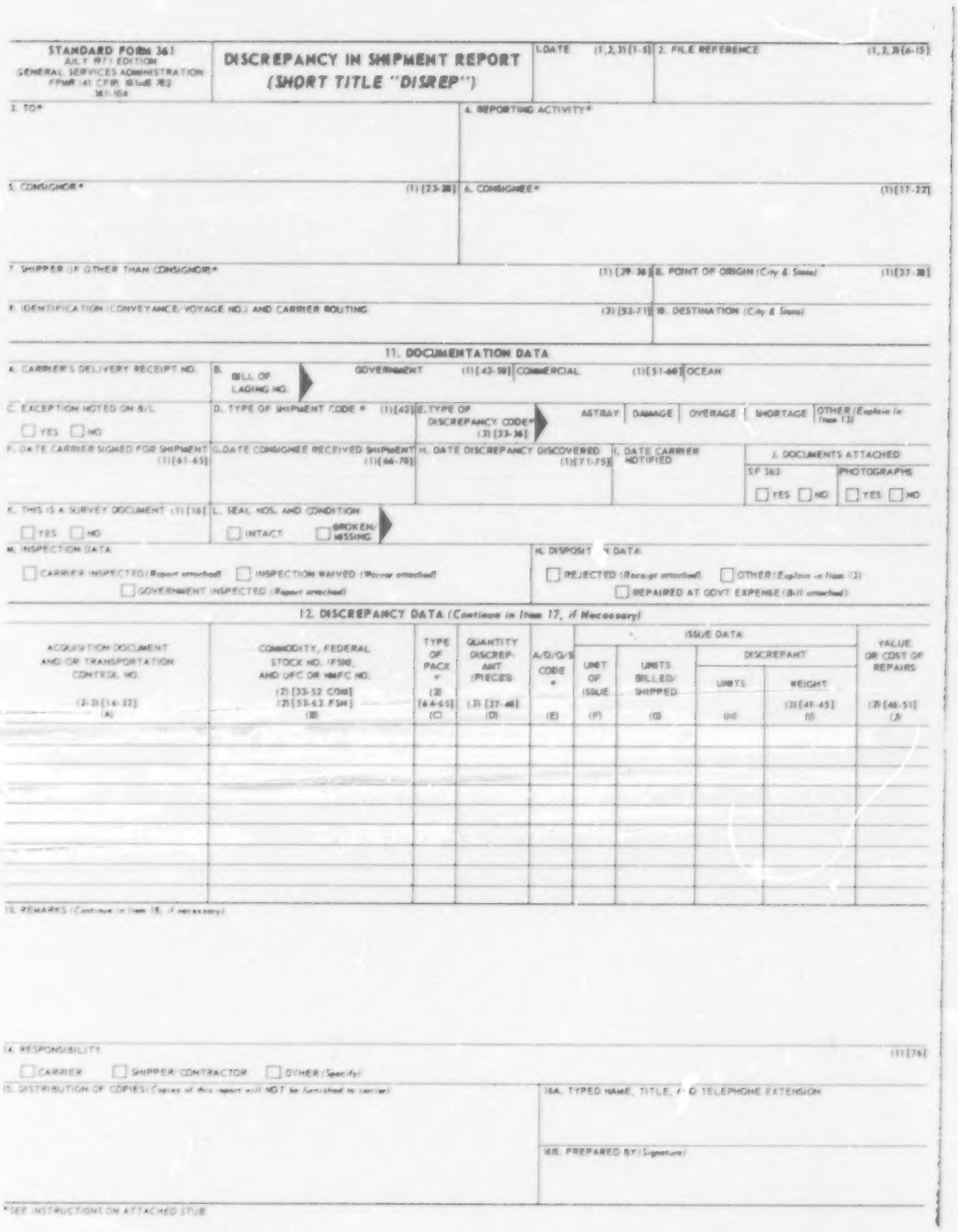
a. SF 361 (Discrepancy in Shipment Report). As in most cases, if anything is damaged, someone must be held responsible for this discrepancy and absorb the loss involved. SF 361 (fig 4-3) will be prepared for:

(1) All overages, shortages, astray shipments, loss or damage to military freight.

(2) All improper loading, blocking, or bracing and improper handling of military freight by carriers.

(3) Adjustment of property records.

(4) Support of official claim files.



STANDARD FORM 361
JULY 1971 EDITION
GENERAL SERVICES ADMINISTRATION
FPMR (41 CFR 101-26) 7B2
361-104

DISCREPANCY IN SHIPMENT REPORT
(SHORT TITLE "DISREP")

1. DATE (1, 2, 3) [1-6] | 2. FILE REFERENCE (1, 2, 3) [6-15]

3. TO*

4. REPORTING ACTIVITY*

5. CONSIGNOR* (1) [23-28]

6. CONSIGNEE* (1) [17-22]

7. SHIPPER (IF OTHER THAN CONSIGNOR)* (1) [29-36]

8. POINT OF ORIGIN (City & State) (1) [37-38]

9. IDENTIFICATION (CONVEYANCE/VOYAGE NO.) AND CARRIER ROUTING (3) [53-71]

10. DESTINATION (City & State)

11. DOCUMENTATION DATA

A. CARRIER'S DELIVERY RECEIPT NO.

B. BILL OF LADING NO. GOVERNMENT (1) [43-50] COMMERCIAL (1) [51-66] OCEAN

C. EXCEPTION NOTED ON B/L ☐ YES ☐ NO

D. TYPE OF SHIPMENT CODE * (1) [42]

E. TYPE OF DISCREPANCY CODE* (3) [33-36] ASTRAY | DAMAGE | OVERAGE | SHORTAGE | OTHER (Explain in Item 13)

F. DATE CARRIER SIGNED FOR SHIPMENT (1) [61-65]

G. DATE CONSIGNEE RECEIVED SHIPMENT (1) [66-70]

H. DATE DISCREPANCY DISCOVERED (1) [71-75]

I. DATE CARRIER NOTIFIED

J. DOCUMENTS ATTACHED: SF 361 ☐ YES ☐ NO; PHOTOGRAPHS ☐ YES ☐ NO

K. THIS IS A SURVEY DOCUMENT (1) [16] ☐ YES ☐ NO

L. SEAL NOS. AND CONDITION ☐ INTACT ☐ BROKEN/MISSING

M. INSPECTION DATA
☐ CARRIER INSPECTED (Report attached) ☐ INSPECTION WAIVED (Waiver attached)
☐ GOVERNMENT INSPECTED (Report attached)

N. DISPOSITION DATA
☐ REJECTED (Receipt attached) ☐ OTHER (Explain in Item 13)
☐ REPAIRED AT GOVT EXPENSE (Bill attached)

12. DISCREPANCY DATA (Continue in Item 17, if Necessary)

ACQUISITION DOCUMENT AND/OR TRANSPORTATION CONTROL NO. (2-3) [14-32] (A)	COMMODITY, FEDERAL STOCK NO. (FSN), AND UFC OR MAFC NO. (2) [33-52 COM] (2) [53-63 FSN] (B)	TYPE OF PACK * (2) [64-65] (C)	QUANTITY DISCREPANT (PIECES) (3) [37-40] (D)	A/D/O/S CODE * (E)	ISSUE DATA: UNIT OF ISSUE (F)	ISSUE DATA: UNITS BILLED/SHIPPED (G)	DISCREPANT: UNITS (H)	DISCREPANT: WEIGHT (3) [41-45] (I)	VALUE OR COST OF REPAIRS (3) [46-51] (J)

13. REMARKS (Continue in Item 15, if necessary)

14. RESPONSIBILITY (1) [76]
☐ CARRIER ☐ SHIPPER/CONTRACTOR ☐ OTHER (Specify)

15. DISTRIBUTION OF COPIES (Copies of this report will NOT be furnished to carrier)

16A. TYPED NAME, TITLE, AND TELEPHONE EXTENSION

16B. PREPARED BY (Signature)

*SEE INSTRUCTIONS ON ATTACHED STUB

Fig 4-3. Discrepancy in Shipment Report (DISREP).

17. DISCREPANCY DATA (Continuation of Item 12)

ACQUISITION DOCUMENT AND OR TRANSPORTATION CONTROL NO. (2-J) [16-32] (A)	COMMODITY, FEDERAL STOCK NO. (FSN) AND UFC OR NMFC NO. (2) [33-52 COM.] (2) [53-61 FSN] (B)	TYPE OF PACK P (2) [64-65] (C)	QUANTITY DISCREPANCY (PIECES) [3][33-40] (D)	A. D./D.S. CODE + (E)	ISSUE DATA: UNIT OF ISSUE (F)	UNITS BILLED/ SHIPPED (J)	D. REPAINT: UNITS (H)	D. REPAINT: WEIGHT (3) [41-45] (I)	VALUE OR COST OF REPAIRS (3) [46-51] (J)

E. REMARKS (Continuation of Item 12)

19. ACTION BY REVIEWING OFFICIALS

A. ABOVE ITEMS HAVE BEEN: ☐ EXPENDED ☐ RECEIVED	B. INVENTORY ACCOUNT	C. CHARGE/TRANSFER TO
D. ACCOUNTING CLASSIFICATION ▶		

E. APPROVING OFFICIAL

(1) TYPED NAME AND TITLE	(2) SIGNATURE	(3) DATE

20. ACTION BY FINANCE CENTER

STANDARD FORM 361
JULY 1971 EDITION (BACK)

Fig 4-3. Discrepancy in Shipment Report (DISREP)- -cont'd.

4-5. MOVEMENT OF SUPPLIES TO STORAGE

The movement of supplies to storage is the final step in the receiving operation and it should be accomplished in the most economical and expeditious manner possible. A forklift truck is generally used for horizontal movements not over 400 feet each way. Warehouse tractor-trailer trains are used for longer distances up to 1 mile; however, cargo trucks or truck tractors may be used in lieu of the tractor-trailer train due to condition of terrain, distance of haul, or size and nature of commodity being hauled. Movement to storage must be accomplished immediately because:

a. Stock control will immediately release pending request from incoming shipments.

b. If the material is not stocked on location immediately, this could result in a stock denial on attempted issue for the material.

Section II. INVENTORY POLICY AND PROCEDURES

4-6. INTRODUCTION

a. General. Accurate physical inventories are essential to the accuracy of stock records and to the support of requisitioners. Inventories and wall-to-wall location checks are required to insure that all assets are counted. Frequency of inventory is determined locally based on item characteristics, pilferability, shelf life, and movement history.

b. Purposes of inventory. There are several purposes for having inventories.

(1) Determine the quantity of material actually on hand.

(2) Determine the difference, if any, between the quantity of stock on hand and the quantity reflected on the records.

(3) Adjust records, as appropriate.

(4) Determine the cause of the difference between the stocks and the records.

(5) Reconcile the money value of stock actually on hand with the money value reflected on the records and adjust the records as needed.

(6) Discover on a timely basis and correct all improper storage and warehousing practices.

(7) Correct all differences between the actual location of stock and the recorded locations.

(8) Rapid verification of all stock denials.

(9) Check for serviceability.

c. Types of inventories.

(1) Cyclic. A cyclic inventory is a recurrent program of physical inventory designed to insure that all assets are verified by physical count during a prescribed period of time. An annual wall-to-wall location verification of all assets will be held by all activities operating stock accounts. Items that have had mass movement should be verified within 30 days after the movement is completed.

(2) Spot inventory. A spot inventory should be taken when there is reason to believe that the quantity shown on the stock record is not in agreement with the quantity in the warehouse or when requested by proper authority. A warehouse refusal is the subject of a spot inventory.

(3) Periodic inventory. Certain types of items require closer control and are scheduled for inventory periodically. These include, but are not limited to:

(a) Retail clothing outlets.

(b) Petroleum, oils, and lubricants.

(c) Subsistence.

(d) Controlled blank forms.

(e) Dry cell batteries.

4-7. PRELIMINARY SURVEY

Prior to the beginning of each segment of the inventory, a preliminary survey conference will be held to determine a cutoff date. This is the primary control date of the inventory. The balance and locator files are frozen and come under the control of the inventory officer. On this date the inventory tickets and inventory control registers are determined.

a. Preparation of inventory tickets. The inventory tickets will be prepared from the location cards. Only one ticket is prepared from the location when the 1-count system is used. Two count cards are prepared for each location when using the 2-count system. The inventory tickets are serially numbered in stock number sequence. The reason for this is that when the inventory teams turn the inventory tickets in to the control desk, the serial number can be checked against the register.

b. Preparation of the inventory control register. The inventory control register is prepared from the balance cards by data processing. The following information will be transferred to the control register from the balance card.

(1) Stock number.

(2) Unit of issue.

(3) Management echelon code.

(4) Last transaction date.

(5) Special-handling code.

(6) Unit price.

(7) Balance on hand at cutoff date.

Materials received during the cutoff date will be held in a special holding area. If the size of a shipment requires that the material be placed on location during inventory, it must be marked to prevent inclusion in the inventory. Receipt for this shipment will not be posted to the stock records after the cutoff date unless the material is required for immediate release. All issues are managed by the inventory control desk. Prior to the cutoff date, action should be taken to insure all pending receipts and issue documents affecting the inventory have been posted to the records. Any documents prepared or discovered during the inventory phase must be routed to the inventory control desk to insure acccuracy of the final inventory. The inventory desk has control over all documents affecting the items being inventoried.

4-8. THE TAKING OF THE COUNT

Although no Marine Corps order specifies the actual conduct of the inventory count, the procedure in this paragraph can be used as a guideline. The conduct of the inventory is dictated by the individual command concerned.

a. Counting assignments. Before counting assignments are distributed, teams are organized and numbered. One man is the counter and one man the recorder. These teams are assigned locations which they are to complete before moving to the next location. They should be alerted to discover and report to the control desk any unrecorded locations of material and any improper storage practices. Unrecorded locations are recorded on manually prepared inventory tickets. Counters record the quantity of each container and the number of containers counted on the inventory tickets. Personnel should be given a briefing just prior to assignment and told to watch for the following:

(1) Proper NSN being inventoried.

(2) Mixed, damaged, and unserviceable stock.

(3) Material on unrecorded locations.

(4) Unit of issue.

(5) Open containers.

(6) Unidentified items.

(7) Incomplete items such as chests and kits.

b. Inventory confirmation. After counting an item, the team should place a positive indication on the material to indicate that it has been counted (attaching a sticker or an identification card will do). An alternate procedure is to hang inventory tickets on the stock prior to inventory. This procedure is very effective and helps the counter in several ways.

(1) The inventory ticket on the material indicates the count has not been taken.

(2) It identifies locations for which no location card is available.

The counter simply removes the inventory card from the material and enters the count. Material with no inventory tickets is recorded on a manually prepared inventory card.

c. Counting requirements. This will depend on the size of the account, the accuracy of the balance and locator cards, and the condition of the warehouse.

(1) The 1-count system. If the 1-count system has been employed, a second count will be be taken to verify the first count only if an adjustment is necessary.

(2) The 2-count system. If a 2-count procedure is employed, the second must be taken by a different count team.

d. Document flow during inventory. Emergency issues made during the inventory from a shipment received during the actual counting phase are handled in the following manner:

(1) The receipt is posted to the control register.

(2) Those postings that affect the accountable balance will be classified as "before" or "after" cutoff date and posted as such.

(3) Issues from materiel being inventoried must also be routed to the control desk and stamped "before" or "after" the count was taken.

(4) Warehouse personnel making a walk-through issue must determine from the signal on the materiel by the inventory team whether the count has or has not been taken.

e. Reconciliation of the count. Upon completion of the count, all inventory tickets are turned in to the inventory control desk. The quantity in each container and the number of containers as recorded on the inventory ticket is extended and totaled. The quantity found on location is recorded in the inventory control register. The cutoff balance is compared to the count balance taken by the count teams.

(1) If a 1-count system has been used, a second count may be necessary to verify the accuracy of the first count when adjustments of quantity are made.

(2) If a 2-count system has been employed, a third count will be taken only if the first two counts are not in agreement.

4-9. INVENTORY PROCESS UNDER MOWAKP

a. Concept. The philosphy that the only good inventory is a 100% count has proven to be invalid from the standpoint of man-hours, materiel expenditures, and the number of errors injected as a result of 100% counts. The inventory process is only applied to those areas of stock management where a need for application of inventory is indicated. Basically, inventory actions are directed toward those areas which prove to be unacceptable when compared to the criteria established by Headquarters Marine Corps. The basic inventory process is constructed around the following functions:

(1) Location/stock/record data verification.

(2) Investigation of warehouse refusals/stock denials.

(3) Special inventories.

(4) Statistical sampling.

(5) All-item count.

(6) System error data file for management and inventory use.

b. Forms and cards. There are several cards and forms you will come in contact with during the inventory. Some of these cards and forms you will be required to complete and some of them will be completed upon receipt from data processing. Regardless of the form you are to prepare, the document identifier code (DIC) must be correct. The DIC is a 3-digit numeric/alpha code that is entered in card columns 1 to 3 to identify the type of transaction. The DIC is entered on all cards and forms necessary to perform any of the inventory functions. The document identifier codes and their format used in the MOWASP subsystem are listed in appendix E of Marine Corps Order P4400.71_. These are the forms and cards utilized in the inventory:

Forms and cards	Document identifier code
1. Stock location card	7A1
2. Systems error card	XF1
3. Item locator inquiry card	XA1
4. DD Form 1348-1, DOD Single Line Item Release/Receipt Document	As required
5. Inventory count card	DKA
6. Statistical sample/all-item inventory request card	XF5
7. Inventory notification card	B7A
8. Statistical sample/all-item inventory request card (nonmovement)	XF4
9. Physical inventory request transaction	DJA
10. Materiel release denial card	A6_
11. Reidentification of stock card	BRS
12. Statistical sample location verification request card	XF3
13. MRO control card	7B2

c. Location verification. This is an inventory procedure whereby the location data (or the national stock number) in the item location file is compared to and reconciled with the physical location of the material. No counting is performed during this process. A basic concept of this program is that all locations need not to be verified so long as a location purity is maintained. A location verification will be performed when the error rate becomes excessive.

(1) Whenever the location error is less than 5%, a statistical sample location verification should be applied to measure location and stock record accuracy.

(2) Whenever the location error rate is greater than 5% or the stock denial error rate exceeds 2% for 3 consecutive months, a 100% location verification must be conducted. In other words, all locations need not to be verified as long as 95% location purity is maintained. If a location verification is to be performed, the inventory branch submits a location verification request card (DIC XF3) to the computer to obtain a listing of all locations. This listing is forwarded to the inventory branch in location sequence. The inventory branch compares and reconciles NSN/location data with the segment. A 100% location verification requires the physical verification of all locations. A statistical sampling is a random selection of locations with a segment.

d. Found locations. All found locations (materiel not on the locator file) will be investigated by the inventory branch. When a found location occurs, the inventory branch will transmit an item location inquiry (DIC XAI) to the computer to obtain all locations and quantities for the NSN found. If a true found exists, the inventory branch prepares records and updates the master inventory file at ICP. This is done by preparing and transmitting a request for inventory (DIC BZA) to correct the MIF record. A stock location change card (DIC ZAI) will also be transmitted to the computer to update the item location file. A system error card is submitted to the system error file if an identifiable error has been discovered (app VI).

e. Unmatched locations. Unmatched locations are investigated by the inventory branch, and corrective action is taken by submission of a stock location card to the item location file and submission of a system error card.

f. Unmatched NSN's. After research has been completed, all unmatched NSN's are submitted to the operations control office for reconciliation action. This action must be completed within three days and the inventory branch notified of the action taken. Misidentified stock discovered by this process must be correctly identified by the submission of a reidentification of stock card (DIC BRS). This action should correct the item locator file and result in the output of a reidentification stock card to the ICP to correct the master inventory file. A system error card is prepared by the inventory branch and transmitted to the system error file.

g. Warehouse refusal. When a warehouse refusal occurs, the DD Form 1348-1, Release Document, should be immediately transmitted to the inventory branch for a spot inventory. The inventory branch requests all known serviceable locations for the NSN which has been refused. Within a four-hour time frame the inventory branch must conduct a search for the material. If the material is found, the DD Form 1348-1 will be annotated with the location and quantity found and returned to the storage branch for processing. If the material is not found, the refusal is classed as a partial or complete stock denial. The inventory branch imprints the DD Form 1348-1 with a stamp (fig 4-5) indicating stock denial and giving the quantity denied. The DD Form 1348-1 is then forwarded to the accumulation area. The accumulation area personnel correct the MRO (Material Release Order) for the document concerned and transmit the MRO control card (DIC ZB2) to the computer. This causes the computer to accomplish the following:

(1) Transmit a material release denial to the ICP.

(2) Freeze the record on the NSN.

(3) Produce an inventory count card (DIC DKA) for all locations and transmit cards to the inventory branch.

Figure 4-5 shows a high-priority MRO that was denied by the warehouse.

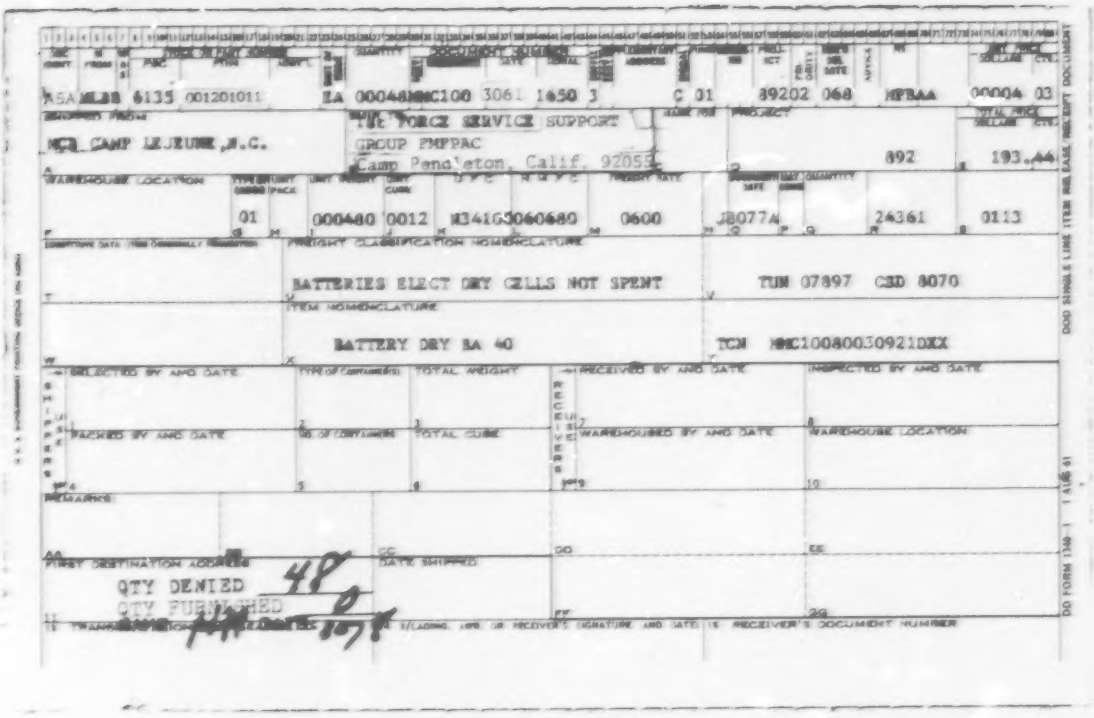

MCB CAMP LEJEUNE, N.C.
FMF FORCE SERVICE SUPPORT GROUP FMFPAC Camp Pendleton, Calif. 92055
BATTERIES ELECT DRY CELLS NOT SPENT
BATTERY DRY BA 40
QTY DENIED 48
QTY FURNISHED 107

Fig 4-5. Warehouse refusal.

4-10. SPECIAL INVENTORIES

a. Special inventory, ICP-originated. This is a single-line or multiline item inventory initiated as a result of a special request by the inventory control point. When the ICP requests a special inventory, it will transmit the inventory count request to the MCLB concerned, indicating a 15-day cutoff, thereby freezing the item records on the MCLB file which is to be inventoried. The inventory branch places the inventory count request in suspense until 1 day before the scheduled cutoff date. The inventory branch of the MCLB then transmits the inventory count request to the computer to freeze the records and produce inventory count cards which are then forwarded to the inventory branch. The inventory branch conducts the count and transmits the inventory count cards back to the computer. The computer will write the count cards quantity over the item locator quantity, unfreeze the records, and transmit the inventory count card to the ICP. Upon receipt of the inventory count cards from the MCLB, the directorate of material management makes the required adjustments and unfreezes the records, provided the adjustment falls within the authorized adjustment criteria. When the adjustment fails to meet the established adjustment criteria, it is rejected and a recount card is transmitted to the MCLB for a recount. When an error has been discovered during a special inventory, the error is transmitted to the systems error file by the inventory branch.

b. Special inventory, MCLB-originated. The MCLB may initiate a single-line or a multiline inventory by transmitting an inventory notification card to the ICP indicating the 15-day cutoff date. When this is done, an inventory request is sent to the computer one day prior to the established cutoff date. All actions thereafter are identical to the special inventory that is ICP-originated.

c. Nonmovement inventory, statistical sampling method. A 4% statistical sampling criteria has been programmed into the computers for use by the inventory branch and the ICP for sampling the materials stored at an MCLB. To initiate action of this programed criteria, the inventory branch selects the Federal groups to be sampled and transmits card input with a document identifier code XF4, indicating the groups to be sampled and a random number between 1 and 25 to the computer. The computer will select the NSN's to be sampled, based on the random number

provided by the inventory branch, and transmit an inventory notification card with a DIC BZA to the ICP with a cutoff date. The cutoff date is a minimum of 15 days prior to the preparation of the inventory notification card. When the ICP receives the inventory notification card from the MCLB, it freezes the records of the items that were selected for statistical sampling. The freezing of the records at the ICP allows all of the MRO's that are being held in consolidation suspense to clear the system prior to the commencement of the actual count. As a result of the inventory notification card processed to the ICP, a physical inventory request transaction is produced and forwarded to the inventory branch. The inventory branch places this request transaction in a suspense file until 1 day prior to the cutoff date that was set by the transmittal of the inventory notification card to the ICP. Then the physical inventory request is transmited back to the computer. The computer freezes the local records, produces inventory count cards, and sends the cards to the inventory branch for action. The inventory branch completes the count and transmits the count cards back to the computer. The computer then produces and transmits inventory count cards to the ICP. The local records are then unfrozen, and the count cards quantity are written over the item locator record quantity by the computer. The cause of any errors discovered is transmitted to the systems error file by the inventory branch. Inventory recount request received from the ICP as a result of the inventory count cards ejected by this process are utilized by the inventory branch to compute error rates within the groups of the statistical sample inventory that was conducted.

c. Inventory systems error file. This file, referred to from time to time in the preceding paragraphs, is the collection of information for use by the stock management and inventory elements as a tool to measure operational effectiveness and inventory program techniques. Errors are recorded on the systems error file by the use of a systems error card indicating primary and secondary responsibility error codes. The primary code indicates what the error is and during which inventory process it was discovered. The secondary error code indicates the nature of the error and where and how it occurred. The responsibility code indicates who committed the error and/or where the error was committed. Each month, or upon request of the inventory branch, the data processing element produces the consolidated systems error management report. This report will be furnished to the inventory branch in the following three formats:

(1) Inventory segment.

(2) Federal group.

(3) Warehouse or picking station number.

Upon receipt of these reports from the data processing elements, the inventory branch analyzes and makes an evaluation of the data furnished on the consolidated systems error management report, reports its findings, and makes recommendations to management concerning the corrective action required. For example, if excessive errors are found to carry a secondary code 04, it would mean that the controlling factors at the PP&P elements were failing to report material under their control. As you can see by the codes listed in Appendix VI, the reasons and causes are many.

Section III. CARE OF MATERIAL IN STORAGE

4-17. INTRODUCTION

Care-in-storage is the insurance that the material that is issued is the best that can be had. In other words, it insures that material that is received at a storage activity has been inspected, protected, preserved, and cared for in storage in such manner that, when it is issued, it will perform its intended purpose. The basic principle of the care-in-storage program is first-in, first-out. This means that the material that is received first will be issued before material received at a later date. The MCLB's have established controls to insure that this method is adhered to. This control is accomplished by means of shelf-life codes, scheduled surveillance inspections, and operational inspection of items.

a. Shelf-life items. These are items which have unstable characteristics to the degree that a storage time period must be assigned to insure that they will perform satisfactorily when issued. There are two types of these shelf-life items. Type I shelf-life items have a definite (nonextendable) storage time period that is established by technical test data. When the storage time period expires, these items must be disposed of.

Type 2 shelf-life items have an assigned storage time period which may be extended after the completion of prescribed inspection and restorative action. Shelf-life items are coded under a shelf-life code system and updated on a scheduled basis (App IV). The shelf-life code is one digit and represents the expected shelf-life period of the item. The PP&P element in the receiving line affixes a preprinted label to the material (fig 4-6). The inspector on the receiving line fills the blank spaces on the label to indicate the manufacturer/cure/assembly date and the expiration date, and circle the appropriate type of condition code. For instance, if the label in figure 4-6 were placed on a shelf-life type 1 item, then the correct code would be circled on the label as well as Type "1". When the shelf-life expiration date reaches a period of between 3 to 6 months, then the condition would be changed to B. When the expiration date reaches a period of less than 3 months, the condition code should be changed to C. For a complete listing of shelf-life codes, refer to the current edition of UM 4400.7T, Marine Corps Users Manual, Data Control.

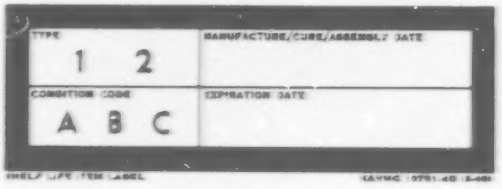


Fig 4-6. Shelf-life Item Label (NAVMC 10701-SD).

b. Computer records. The computer, upon receipt of a location confirmation card from storage verifying that shelf-life material has gone on location, establishes a separate trailer record for each lot received. The location confirmation card shows the expiration date of shelf-life material in the next inspection date card columns. On a monthly basis, the computer scans the item locator file for those items indicating a shelf-life code and the computer updates the shelf-life. The computer makes condition code changes from A to B or B to C, in accordance with the criteria established by the shelf-life code. When condition code changes are made within the computer, the process produces a material management change card (with DIC DAC) which is transceived to the ICP to update the master inventory records. The computer will also create a storage item change card with a DIC ZSS which is sent to the storage section so that it can change the condition and obliterate the past condition code. For example, if the condition code has changed from "A" to "B" obliterate "A" circle the "B," and return the material to location.

4-12. STORAGE QUALITY CONTROL AND RELIABILITY MANAGEMENT PROGRAM

a. Introduction. This program at the Marine Corps Logistic Bases and Fleet Marine Force (FMF) activities having custody of mount-out stocks to support mobilization is organized to prevent deterioration of the system. Quality control is defined as measures taken by the material producer to eliminate causes of defects in products during production. This program is so designed as to insure that material is ready for service through a constant surveillance of material in storage. This program consists of, but is not limited to, cyclic, scheduled, and special inspections. These inspections are conducted to:

(1) Properly identify items.

(2) Determine the condition of items.

(3) Correct observed deficiencies on location to the greatest extent possible. This may include the following:

(a) Container repairs.

(b) Correction of incomplete markings.

(4) Determine completeness of items.

(5) Detect mildew, spoilage, insect infestation, and rodent or other pest damage to stocks.

b. Inspections. Under the care-in-storage program, automated inspections are processed on schedules that have been predetermined. The inspection is completed manually, but the process of having to make lengthy reports has been eliminated.

(1) Inspection of incoming material. When a procurement source inspection has been performed, duplicate inspections are not conducted, except for the customary exterior inspection for in-transit damages, quantity, and verification of contracted specified levels of protection. Material protection beyond that called for in the procurement document is forwarded to the PP&P branch of the MCLB.

(2) Inspection of material returned from user. Material returned from a user receives a 100% inspection for condition, preservation, and packing. When material is received from a using unit, whether internal or external to the Marine Corps, it must receive a 100% operational inspection. The PP&P element of the receiving line determines the level of preservation and packing required and, within its capability, packages and marks serviceable material with the current NSN and unit of issue. Unserviceable reparable material is presented, packed, and marked with the current NSN and unit of issue. In this case preservations and packing is only applied to the extact necessary to prevent further deterioration. Both serviceable and unserviceable reparable material requiring preservation and packing beyond the capability of the PP&P element of the receiving line is sent to the PP&P branch for processing.

(3) Inspection lots and dates. Operational test code (OTC) "1" major end items received at the MCLB are assigned a surveillance inspection and operational test lot number and the next scheduled inspection date according to local methods, determinations, and capabilities of the receiving MCLB. The inspector annotates the location confirmation card, indicates inspection lots, and assigns the next inspection date. Additionally, a change card is transmitted to the computer to update the USMC/serial number file. For a secondary technical OTC "C, 3" items, the inspector annotates the location confirmation card and indicates the inspection dates assigned.

(4) Shelf-life. When testing indicates that the shelf life may be extended on a type "2" item, a surveillance inspection is performed and a new preprinted label is affixed to the material indicating the type, date, expiration date, and condition code. If the material was removed form location for the inspection, it should be returned to the location from which it was removed. When material passes the surveillance test but fails the PP&P phase of the inspection, it should be represerved to the level called for on the original levels of protection set forth upon receipt.

(5) Unserviceable material. Occasionally during routine care-in-storage inspection, the lot or sample size passes, but a few unserviceable items are found. These must be taken from the lot since they have a different condition code. Notification is sent to the computer for the necessary adjustments, the ICP is notified, and the material is disposed of in accordance with current regulations.

c. Control measures. Some of the control measures that may be employed in conducting an effective storage quality control program are as follows:

(1) Sanitation. Cleanliness is one of the most important of these control measures since insects and rodents thrive in filth.

(2) Control of temperature. The proper control of temperature is another measure that can be used to retard insects. Temperatures of 40° to 50° F will retard most insect activities and temperatures of 30° F will kill most insects.

(3) Sprays. There are three types of sprays that are effective against insects: residual, contact, and aerosol.

(a) Residual insecticide sprays (those that leave an effective residue) should be used to provide long-lasting protection to noninfested stocks or to prevent the spread from previously infested materials.

(b) Contact sprays (those that kill on direct contact only) should be used for the control of flying insects (moths, flies, etc.)

(c) Aerosol sprays are liquids suspended in a gas. This type of spray is generally used to supplement the residual spray.

(4) Rat control. To be effective and successful, this must be thorough and continuous. The rat population must be reduced, and conditions favoring return of rats must be eliminated. Rodent control measures consist of ratproofing or the use of poisons. Ratproofing is accomplished through the use of mesh wire or sheet metal around windows, pipes, and doors. No opening greater than 1/4 inch should be allowed. There are several poisons which can be used sucessfully, such as red squill, antu dust, and sodium flouracetate. The most effective but most dangerous of these poisons is the sodium fluoracetate, and it should be applied by a registered exterminator only.

(5) Fumigation. Fumigation should be carried out only by personnel who have been trained in the handling and properties of fumigants. These personnel should also be trained in first aid, with special reference to gas poisoning. A person should never work alone during fumigation operations. When a storage unit that is normally inhabited is to be fumigated, large warning signs must be placed on all possible entrances and one or more guards should be placed during the fumigation and aeration periods. The medical officer should be notified beforehand of the type of fumigant to be used and the place and time of fumigation operations.

Section IV. SHIPPING OPERATIONS

4-13. STOCK LOCATION FACTORS

The DOD location numbering system that is used for location of stocks at a storage unit is designed so that you can pick material on a continual line flow. This eliminates the necessity of traveling back and forth and saves time in getting material ready for shipment. Figure 4-7 illustrates the pattern of stock picking in relation to aisles and segments. Note that the arrows start at one end of the station and flow back and forth to the other end. With this method, picking documents are computer-sequenced by segments within each aisle or row enabling a stock picker to pick both sides of an aisle during one traverse.

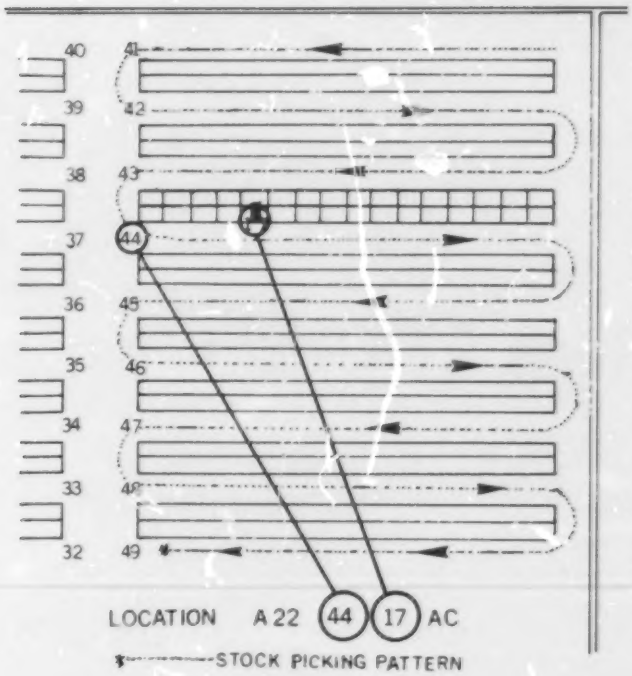


Fig 4-7. Stock picking pattern (arrows).

4-14. PROCESSING ISSUES

a. Routine and priority issues. Before material can be shipped to the using unit, it must be located and packed. The use of the computer to arrange picking documents in sequence of location has accelerated the picking operation. When the picking document is received at the picking station, it has been processed through the computer files and the documents have been sequenced by priority. The material release order has been matched against the item locator file for availability of NSN and operational test code application. If the material release order does not have a special-handling code (App III), it will be assigned to a shipment and transportation unit and to a cyclic shipping day (App V) within the time frame of the priority on the materiel release order (DD form 1348-1).

b. Priority designators. The Uniform Materiel Movement and Issue Priority System (UMMIPS) provides the basis for expressing the relative importance of requisitions and other materiel movement transactions through a series of two-digit codes known as priority designators. This priority designator is used to insure that request for materiel are processed in accordance with the military importance of the requesting unit and the urgency of need of the requested item. There are certain time frames and processing standards established for the different priorities as set forth in figure 4-8. A standard delivery date (SDD) is the maximum ending calendar date by which normal processing and shipping in the logistics system will permit receipt and recording of the materiel by the consignee. The SDD is computed by adding the total appropriate time allowance indicated in figure 4-8 to the date of the requisition. A required delivery date (RDD) is a date when materiel is actually required by the customer and may be used when supplies are needed sooner or later than the SDD. When RDD earlier than the computed SDD is cited, all activities must exert every effort to effect delivery by the specified date. MCO 4400.16_ contains detailed instructions on assignment and use of the priority designators.

TIME SEGMENT	TIME STANDARD (IN CALENDAR DAYS, FOR PRIORITY DESIGNATORS 01-03	04-08	09-15	For use only when shipments are consolidated at origin into SEAVAN containers 1/
A. Requisition submission	1	1	1	
B. Passing action	1	1	2	
C. ICP availability determination	1	1	3	09-15
D. Depot/storage site processing	1	2	8	23
E. Transportation hold and CONUS in transit to CONUS requisitioner, Canada, or to PMZ	3 2/	6 2/	13	13
F. Overseas shipment/delivery:				
1. To Alaska, Hawaii, South America, Caribbean, or North Atlantic	4 2/	4 2/	38	23
2. To Northern Europe, Mediterranean, or Africa	4 2/	4 2/	43	28
3. To Western Pacific	5 2/	5 2/	53	38
G. Receipt takeup by requisitioner	1	1	3	

1/ The consolidation of SEAVAN containers at points of origin (i.e., depots) has been promoted by allowing flexibility in time standards between the transportation segment and the supply segment. Accordingly, additional time may be made available for loading of containers at origin to provide incentive to plan more source to user SEAVAN loads with no sacrifice to the total order-ship time or depot performance.

2/ Time standards for priority designators 09-15 apply when cargo is diverted to surface movement.

Fig 4-8. Priority processing standards.

c. Shipments that are off base. When the material release order is processed by the operational control office, those that are off-base shipments are assigned a cyclic shipping day (CSD) and a transportation unit. The CSD is the normal date that the materiel must be shipped in order to reach the customer by the required delivery or standard delivery date. The computer obtains the CSD code and transmit time from the activity code directory. Transmit time is then subtracted from the required delivery date or priority deliver date to obtain a mandatory shipping date (MSD). The CSD is then determined by utilizing the assigned code to select the regularly scheduled shipment date closest to, but not exceeding, the mandatory shipping date.

d. Shipment/transportation units. A single shipment consists of one or more MRO's or line items having a common denominator making them compatible for combining into one shipment.

The common denominators are:

(1) Same consignee or activity code (AC).

(2) Same approved project.

(3) Compatible CSD.

(4) Same cargo compatibility code.

Each shipment unit will contain material for only one AC. The MRO's AC must be identical to the shipment unit AC. The shipment unit CSD must not exceed that of the MRO, the compatibility codes must be equal, and the project codes must match if one is assigned. An MRO which exceeds 10,000 lb in weight, 850 cube, or is for an outsize dimension item will cause the shipment unit to be closed. Shipment units are always closed upon reaching 9,999 line items, 10,000 lb in weight, 850 cubic feet, or documentation release date. Even though shipment units are closed, they are not released until either a shipment release request is received or the documentation release date is reached. When a new shipment unit is built, the document release date is computed by deducting 3 working days for domestic and 5 working days for export shipments from the cyclic shipping date. The transportation unit consists of one or more shipment units under one or more transportation control numbers (TCN's) consolidated for shipment under one TCN, moving in a single conveyance from one origin to one destination or trans-shipping point.

Each MRO is assigned to a transportation unit at the time it is assigned to a shipment unit. Transportation units are closed upon reaching 30,000 lb in weight, 1,500 cube (cubic feet), or documentation release date.

e. Issue management reports.

(1) Shipment workload forecast. The shipment unit file is screened daily, and a shipment workload forecast prepared. This forecast is a summary of all MRO's pending shipment and lists the forthcoming workload for a period of approximately 3 weeks. The operational control office utilizes the forecast to balance the workload by requesting additional shipping units for slow periods. Additional workload is requested by submitting the shipment release request.

(2) Warehouse workload summary. A warehouse workload summary is produced by the data processing element and forwarded to the storage element daily. This summary indicates the next day's issue workload by warehouse based on the shipment units to be released. It should be used to determine personnel and equipment requirements to accomplish this workload.

f. Parcel post issues. The storage element must process parcel post issues by accomplishing the following.

(1) Pick the material and forward it to the accumulation area together with DD Form 1348-1.

(2) The accumulation area personnel locate the material, match the DD Form 1348-1 against the shipment planning control listing (SPCL), and insert the proper copies of the DD Form 1348-1 inside the container.

(3) Place the parcel post label, one copy of the DD Form 1348-1, and two copies of the SPCL with the container.

(4) Destroy the freight labels and deliver the shipment to the postal authorities.

(5) Complete the materiel release order control cards and transmit them to the computer.

(6) When the MRO control cards are fed into the computer, they will be processed to the MRO register. This process causes a materiel release confirmation to be transmitted via AUTODIN to the ICP.

g. On base issues. The MRO's that are determined to be on base issues will be processed by the storage element in the following manner:

(1) Pick the material and forward it to the accumulation area with the DD Form 1348-1.

(2) The accumulation area personnel match the DD Form 1348-1 against the shipment planning control listing and either deliver the material to the customer or notify him to pick it up.

(3) Complete the MRO control cards and transmit them to the computer.

4-15. ROUTINE GENERAL FREIGHT ISSUES

When a determination is made that a shipment is not on base and cannot go parcel post, the files are accessed to obtain the necessary transportation data to recommend a carrier and routing and create the transportation planning worksheet. Documentation is then produced and distributed. The DD Form 1348-1 goes to the storage element in location sequence to be used as a picking ticket. Both bin and bulk location are furnished if both are to be picked. The warehouse workload summary is forwarded to the storage element and used to determine personnel and equipment requirements. The MRO control cards are forwarded to the transportation element

in SUCN (shipment unit control number) and line number sequence for completion by the transportation element upon receipt of the materiel and DD Form 1348-1 from the storage element. One control card is furnished for each DD Form 1348-1 released to the storage element and is used to provide actual weight and cube to prepare the Government bill of lading (GBL). The SPCL (shipment planning control listing) will be used in lieu of NAVMC 10F07 SD. The SPCL is forwarded to the transportation element in SUCN sequence. Upon receipt of SPCL, the transportation element inserts the piece number, type of pack, total pieces for each MRO, total weight per MRO, and total cube for each MRO. The transportation element also receives the transportation planning worksheet that provides the recommended carriers and routing.

4-16. SPECIAL-HANDLING SUSPENSE ISSUES

Upon receipt of an MRO for an item which has been assigned an operational test code, the MRO is written to the MRO register and special-handling suspense file. A notification of special-handling item card is produced and transmitted to the operational control office. One card is produced for each OTC 1 item to be selected. That is, of the MRO quantity is 50, then 50 special-handling cards are produced. If the OTC is 2 and the MRO quantity is 50, there will be only one card produced, and it will be for the total quantity of 50. The operational control office selects the items by USMC/ serial number, inserts the serial numbers in the special-handling item cards, and transmits the cards back to the computer where they are written in the work request file. Upon receipt of the special-handling cards the computer accesses the file, obtains the necessary data elements, and produces a repair notice for the end item and stock selection documents for collateral equipment, if required.

This stock selection card is forwarded to the storage element which picks the collateral equipment (preassembled and stocked by sets) and forwards it to the PP&P element. The storage element then transmits the stock selection card back to the computer. This causes a materiel release confirmation to be produced and transmitted to the ICP for the collateral equipment. Stock selection cards for collateral equipment will always bear the same document number assigned to the MRO for the end item. The document number is then the key for the association of the collateral equipment to the end item. The PP&P element receives the collateral equipment, preserves it, packs it, and turns it over to the major item liaison team for holding until completion of repair processing of the end item.

Upon completion of repairs to the end item, the repair element releases it to the major end item liaison team (MILT), who associates it with the collateral equipment it has been holding. The MILT then request a final inspection by the quality control inspectors. If it passes inspection, it is released to the transportation element for shipment.

WAREHOUSING OPERATIONS

Lesson 4

Storage Procedures

STUDY ASSIGNMENT: MCI 30.3h, Warehousing Operations, chap 4.

LESSON OBJECTIVE: Completion of this lesson will enable you to identify the principles used in receiving operations, inventory procedures, and quality control, which includes care-in-storage and insect and rodent control.

WRITTEN ASSIGNMENT:

A. Multiple Choice: Select the ONE answer which BEST completes the statement or answers the question. After the corresponding number on the answer sheet, blacken the appropriate circle.

Value: 1 point each

1. Receiving operations concern the manner in which material is brought into the

   a. warehouse.
   b. supply system.
   c. transportation system.
   d. storage element.

2. When there is no advance copy of a delivery document, what is checked to determine if the correct shipment was received?

   a. Seal number
   b. Quantity received
   c. Characteristics of supplies
   d. Size of carrier

3. It is possible to plan a receiving operation in advance of the actual receipt of supplies by using

   a. the Storage and Material Handling Manual (NAVMC 1101).
   b. advance copies of bills of lading.
   c. a copy of the billing document.
   d. shipping documents attached to the material.

4. What type of inspection should be conducted prior to unloading of incoming supplies?

   a. Visual
   b. Technical
   c. Surveillance
   d. PP&P

5. Which is NOT a principle in unloading of supplies?

   a. Straight-line flow
   b. Continuous flow
   c. Efficient handling
   d. Surveillance inspections

6. Which unit normally assigns the checker for tallying of incoming supplies?

   a. Warehouse
   b. Transportation
   c. Receipt
   d. Inventory

7. Which form is used to tally incoming supplies?

   a. DD Form 6
   b. DD Form 250
   c. DD Form 825
   d. DD Form 826

8. What type of deficiencies are reported on the SF 361?

a. Marking
b. Repeated deficiencies from the same activity
c. Overages
d. Inventory deficiencies

9. Which form is used to report discrepancies in shipments?

a. SF 361
b. DD Form 6
c. DD Form 285
d. DD Form 826

10. The SF 361 can be prepared for

a. marking discrepancies.
b. adjustment of property records.
c. stock location.
d. location verification report.

11. Which form is prepared to support official claim files?

a. SF 361
b. DD Form 1348-1
c. DD Form 826
d. DD Form 6

12. What is a factor which would cause repacking and marking containers at the time of unloading?

a. To verify the quantity of each container
b. Changes in stock number, item identification, or other data
c. To insure uniformity of all containers
d. To check for proper preservation

13. Which piece of equipment is generally used for horizontal movement of supplies a distance of 300 ft?

a. Cargo trucks
b. Warehouse tractor
c. Truck tractor
d. Forklift truck

14. Frequency of inventory is determined locally based on item characteristics pilferability, and

a. shelf life and movement history.
b. serviceability checks
c. supply officer's discretion.
d. higher echelons of supply.

15. Which is a purpose of an inventory?

a. Determine National Stock Numbers (NSN)
b. Adjust records, as appropriate
c. Determine unit of issues
d. Determine mass movement items

16. Determining the quantity of materiel actually on hand is a purpose of

a. gain transactions.
b. an inventory.
c. a preliminary survey.
d. taking a count.

17. Subsistence items are inventoried during a _____ inventory.

a. periodic
b. cyclic
c. special
d. spot

18. How often are wall-to wall location verifications required for activities operating stock accounts?

a. Annually
b. Semiannually
c. Quarterly
d. Monthly

19. Which type of inventory is conducted to insure that all assets are verified by physical count?

a. Periodic
b. Cyclic
c. Spot
d. Special

20. When a warehouse refusal occurs, which inventory function is performed?

a. Statistical sample count
b. Spot inventory
c. Cyclic inventory
d. Wall-to-wall location verification

21. The purpose of the inventory preliminary survey conference is to determine

a. the type of inventory.
b. a cutoff date.
c. counting assignments.
d. the type of stickers to be used.

22. After a mass movement of an item, how soon should stock of this item be verified?

a. Within 30 days after the movement
b. At the next periodic inventory
c. At the next scheduled cyclic inventory
d. Forty-five days after the movement

23. What action is taken on materiel received during the day of the inventory cutoff date?

a. Hold materiel in a special holding area.
b. Process receiving documents and post to stock records.
c. Stock materiel on location and hold receiving documents.
d. Issue all outstanding request for supplies.

24. What action is taken on documents prepared or discovered during the inventory?

a. Route to inventory control desk.
b. Forward the documents to stock locator.
c. Hold all documents until inventory is completed.
d. Process as routine documents.

25. What is the purpose of using an inventory sticker on materiel?

a. To indicate quantity on location
b. To identify items requiring PP&P
c. To identify unserviceable materiel
d. To indicate the materiel has been counted

26. Whenever the location error rate is 1% or less, the inventory procedure is used to measure stock record and location accuracy.

a. Statistical sample location verification
b. Location verification 100%
c. All-items count
d. Periodic inventory

27. What inventory procedure is used when the stock denial error rate exceeds 2% for 3 consecutive months?

a. Spot inventory
b. Statistical sample location verification
c. Location verification 100%
d. Periodic inventory

28. What is the location purity rating for an MCLB?

a. 96%
b. 95%
c. 94%
d. 93%

29. What action do you take with the DD Form 1348-1 when a warehouse refusal occurs?

a. Transmit it to the inventory branch for action.
b. Forward it to the stock locator.
c. Stamp it as stock denied and return it to the receipt section.
d. Attach a systems error file card to it.

30. A warehouse refusal must be investigated within

a. 4 hours.
b. 24 hours.
c. 4 days.
d. 7 days.

31. Which form is used as a shelf-life item label?

a. NAVMC 10701
b. DD Form 6
c. DD Form 825
d. DD Form 826

32. What is the basic principle of the care-in-storage program?

a. First-in, first-out issue
b. Last-in, first-out issue
c. Packaging and preservation
d. Sanitation and pest control

33. What is indicated by the shelf-life code?

a. Expected shelf-life period
b. Shelf-life type 1 or 2
c. Level of preservation
d. Receipt date

34. What action do you take regarding type 1 shelf-life items whose shelf-life period has expired?

a. Dispose of them.
b. Repackage them.
c. Issue all assets as soon as possible.
d. Change all assets to type "2" shelf life.

35. What type of inspection must be conducted on material received from a using unit?

a. Visual exterior
b. Surveillance
c. Operational 100%
d. Operational 50%

36. Which action do you take when a few unserviceable items are found in a lot during care-in-storage inspections?

a. Pull the entire lot from the location.
b. Pull the unserviceable items from the lot.
c. Assign a new shelf-life code to the unserviceable items.
d. Assign a new shelf-life code to the entire lot.

37. Which poison, or type of poison, should be used by a registered exterminator?

a. Red squill
b. Antu dust
c. Residual insecticides
d. Sodium flouracetate

38. Which type of spray should be used in the control of moths?

a. Antu dust
b. Contact
c. Aerosol
d. Residual

39. A unit in Hawaii submitting a request for supplies on priority 03 should receive the supplies within _____ days.

a. 9
b. 7
c. 11
d. 15

40. Which system is used to insure that request for materiel are processed in accordance with the mission and urgency of need?

a. Quality control
b. Priority designator
c. Performance measurement
d. Reliability management

41. What date is assigned by the operational control office for off-base shipments?

a. Cyclic shipping day
b. Mandatory shipping date
c. Required delivery date
d. Priority delivery date

42. What is the maximum cubic feet allowed before a shipment unit is closed?

a. 10,000
b. 1,500
c. 850
d. 800

43. What is the maximum number of line items allowed before a shipment unit is closed?

a. 99
b. 999
c. 9,999
d. 99,000

44. Several items may be combined into single shipment unit whenever they have any one of four common denominators that make them compatible for combining into one shipment. Which is NOT a common denominator?

a. Same approved project
b. Same condition code
c. Same consignee or activity
d. Compatible cyclic shipping day

45. Which issue management report should be used to determine personnel and equipment requirements for shipment and issues?

a. Shipment workload forecast
b. Warehouse workload summary
c. Shipment planning control listing
d. Transportation planning worksheet

46. Which code indicates that a materiel release order is for shipment of special-handling items?

a. Operational test code (OTC 1, 2 & 3)
b. Shelf life
c. Transportation
d. Ownership

47. To enable a stock picker to pick both sides of an aisle or row during one traverse, picking documents are computer-sequenced by

a. compartments.
b. levels.
c. station
d. segments.

48. How many special-handling cards are produced for an MRO quantity of 50 OTC 1 items?

a. 1
b. 25
c. 50
d. 100

Total Points: 48

* * *

Chapter 5

STORAGE OF SPECIAL COMMODITIES

Section I. LUMBER

5-1. HANDLING AND STORAGE

a. Objectives. The objectives of lumber handling are to load, transport and unstack lumber economically and without damage. The objective of storage is to maintain the lumber at, or bring it to, a moisture content suitable for its end use with a minimum of deterioration. These objectives are easily attained if good handling and storage practices are followed. Adequate protection of lumber in storage will help prevent damage by fungi, insects, and changes in moisture content.

b. Condition of lumber placed in storage. The condition of lumber placed in storage, with respect to moisture content and fungus infestation, has an important bearing on the keeping qualities of the lumber over long periods. Fungi and termites are kept down when the moisture content of the wood is less than 20%. All lumber must be checked thoroughly for moisture content and fungus before placing it in storage. During storage it is important to protect the lumber from changes in moisture content. Moisture-content can lead to checking, warping, twisting, and stains which make the lumber unsuitable for its intended use.

c. Examination of incoming shipments. When lumber is received in drafts (assembled units), choose several from differents parts of each shipment to dissassemble for examination. The method of stacking each shipment must be determined by competent personnel. Lumber is received hand loaded in boxcars or in strapped unit loads on gondolas, flatcars, or trucks. Methods have been designed to eliminate double handling. These methods may vary under certain conditions, and the warehouse supervisor can determine the best method to use. Standard storage and handling methods are found in the Storage and Material Handling manual (DOD 4145.19-R-1).

5-2. BUILDING OF LUMBER DRAFTS

a. Size. A draft of lumber is formed by stacking lumber to a desired height and width. Drafts for yard drying are likely to vary between 3 1/2 feet and 4 feet (with 4 feet the most common) wide and 3 feet to 4 feet the average height. The width of the draft will be determined by the width of the lumber and fork capacity of available forklift trucks. When stacking lumber, it is necessary that the drafts be uniformed in size so that each draft of the same material contains the same number of board feet. Random lengths of lumber should never be used to make up a draft unless a small amount is received and sorting would make small drafts. In this case the lumber is sorted by length with the longest pieces placed on the bottom and the rest grouped in length sequence.

b. Air circulation within the draft. The air drying of lumber is dependent on temperature and humidity. Increasing the height of the stack tends to retard drying in the lower part of the stack. Tall stacks also tend to restrict wind movement at the ground level of the yard. Lumber stacked in drafts may range from 4 to 20 feet in height with a 6-inch spacing between the drafts which will increase the air circulation at the lower levels of the stacks.

c. Stickering of lumber.

(1) Moisture contents over 24%. Partially green lumber or lumber with a moisture content of 24% or more requires good air circulation within the draft to carry excess moisture off as fast as possible. Lumber with 24% moisture or more should be stickered between each layer with sticks 2" or 3" thick. Hardwoods with a thickness of 1 1/4" and over should be stickered with sticks 1" or thicker.

(2) Moisture contents over 20% to 23%. This lumber should be stickered with lath (1 1/2" x 1/2" x 48") between each two layers of material unless the lumber is 1 5/8" or thicker. Then you should place sticks between each layer. Hardwood with this moisture content must be stickered with 1" or 1 1/2" by 3/4" stickers of sufficient length to provide support and prevent warping. A sticker guide should be used in the placing of the sticks to maintain proper alignment. Sticker spacing may be altered to conform to pile foundations according to the storage plan used.

d. Binding and marking. Each draft of lumber assembled for storage or shipment should be secured with appropriate binding, prior to or immediately after moving the draft from the stacking butt board. Bindings are placed directly over the stickers in order to prevent distortion of the lumber. Bindings should be over the second and last sticker in each draft. If the lumber is to be moved immediately from the unloading point to the point of use, no binding is required. The binding material should be either 10-gage round steel galvanized wire or 1 1/4-inch .035-gage flat steel straping. The galvanized steel wire is the preferred binding material because it is more resistant to corrosion. After binding and prior to final storage, each draft should be marked. Marking should include stock number, board feet, and the date received. Lumber received on 15 July 1976 would be dated 196/76 (196th day of 1976). Marking in this manner will make it possible for each activity to issue the oldest stock first.

5-3. STORAGE AREA

a. Yard location and surface. The best storage yard is located near the spot where lumber is received. The location should be on high ground that is level, well drained, remote from water bodies or wind-obstructing trees, buildings or other objects. The storage yard can be covered with cinders, gravel, shell, crushed stone, asphalt, or concrete.

b. Yard layout. A yard for storage of lumber is laid out in blocks separated by aisles. The actual yard layout is determined by the size and shape of the available area and the equipment used for stacking. Aisles in yards where the lumber is machine-stacked are usually 24 to 30 feet wide, the optimum being 24 feet. To increase air circulation within the stacks, an aisle 2 to 3 feet in width should be maintained between the rows of stacked lumber.

(1) Spacing between stacks. In actual storage, the spacing between stacks of lumber varies but a space of 6" to 12" generally should be sufficient.

(2) Roof proctection for stacks. Lumber which cannot be stored under cover should be protected from the weather by adequate roofing. To afford maximum protection a roof should project 12 to 18 inches at the end of the stack and approximately 6 inches over the sides.

(a) Roof lumber. A good low-cost roof which is adequate for lower grades of lumber or lumber which will not remain in storage for a long period of time can be built into each draft as it is formed. To form this roof, one piece of lumber is left out of the top layer and the remainder is staggered or placed so each board covers an opening between the tiers. Moisture is prevented from entering the draft and the two top layers of each unit becomes the roof.

(b) Special roofing. Building paper or roll roofing may be combined with boards to form a roof. This type of roof consists of a double layer of boards with paper or roofing between. Boards, roofing, plywood panels, aluminum, metal sheeting, and other materials may be combined to form the roof. Special roofing should be used only when lumber such as oak and other high-grade lumber is to be stored for long periods of time for air drying or when thoroughly seasoned lumber must be placed in open storage. Regardless of the type of roof used, it should be raised several inches to permit air movement between the roof and the top of stack.

c. Covered storage

(1) Open sheds. An open shed is similar to a storage yard without a roof. In this type of covered storage, however, lumber may be stored on level foundations 12 inches in height. The end moisture content requirements for lumber stored in open sheds should be between 12% and 19%.

(2) Closed sheds. Closed sheds are used primarily for the storage of kiln-dried or well seasoned lumber, plywood, molding, frame stock, and other show-type lumber intended for special use where moisture content requirement is 12% or less.

Section II. AMMUNITION AND EXPLOSIVES

5-4. GENERAL

Military ammunition and explosives are products of war and manufactured primarily to kill and destroy. Such products have hazards that affect all handling operations from the time of manufacture until they are expended. The foremost consideration of ammunition storage is that ammunition and explosives must be handled, stored, and shipped in a manner that will afford protection against deterioration, accidental ignition, and detonation. Safety rules and regulations governing the care, preservation, and storage of ammunition are issued by the appropriate military services. These rules and regulations clearly state those that are mandatory and those that are advisory. The latest editions of American Standards as published by the American Standards Association and the National Bureau of Standards Codes are accepted as references for the military services.

5-5. FACILITIES

Magazines are used to store ammunition and explosives. A magazine can be any building or structure except an operating building. Igloos are the most commonly used. An igloo magazine is an arch-type earth-covered magazine which may be constructed of concrete, metal, or wood. There are several different types of magazines such as: igloo magazines barricaded, igloo magazines unbarricaded, standard igloo magazines, special-type magazines, and above-ground magazines. In case of emergencies, open storage may be utilized.

a. Igloo magazines barricaded. This type of magazine is located so that the earth-covered sides or backs are toward each other or the front of one igloo with a barricaded door is facing toward an earth-covered side, back, or barricaded front of another igloo.

b. Igloo magazines unbarricaded. This type of magazine is located so that the front of one igloo without a door barricade is toward an earth-covered side or back of another igloo.

c. Standard igloo magazine. A standard igloo magazine is an earth-covered, reinforced concrete, arch-type magazine with or without a door barricade. Igloos provide good ventilation and the temperature usually ranges between 40° and 45° F in winter and 60° and 70° F in summer. The arched roof is an added safety feature because, if an explosion occurs, the highest point of the arch would collaspe, causing less damage.

d. Special-type magazines. These are igloo magazines with steel or wood (instead of concrete) arches and steel, wood, or concrete end walls. Earth covered reinforced concrete magazines, either dome or box-type, are considered special-type magazines.

e. Above-ground magazines. These can be any type of magazine other than standard igloo or special-type magazines, either barricaded or unbarricaded.

f. Open storage. This type of storage is undesirable and should be used only as an emergency expedient when authorized by controlling authority. Such items as pyrotechnics, propellants, rockets, and black powder should not be stored in the open. If it is necessary to store these items in the open, ventilated cover must be provided.

5-6. WAREHOUSING

a. Storage for certain ammunition and explosives

(1) Small-arms ammunition. May be stored in above-ground magazines. Where there is more than one type available, the type that offers the best protection from fire should be selected.

(2) Bombs with high explosives (HE) components. Bombs should be stored in barricaded earth-covered magazines if possible.

(3) Separate-loading shells or projectiles. These should be stored in earth-covered magazines.

(4) Pyrotechnic items. These items should be stored in magazines which are well ventilated, dry, and in good repair.

(5) Pilferable ammunition. Special precautions must be taken in storing such items as ammunition for caliber .22, .32, .38, shotgun shells, firecrackers, and similar items. The use of special locks and keys is required. The keys must be controlled and issued only to the personnel necessary to carry on the normal receipt, storage, and issue mission.

b. Storage aids

(1) Box pallets. Small quantities of ammunition may be retained in box pallet storage to meet current demands. The box pallet should be used to store hard-to stack and crushable items such as carton-packed items, fiber containers, and small loose items.

(2) Dunnage. Dunnage should be placed beneath the last layer of ammunition or explosives to keep them from coming in contact with the floor or ground. The type of dunnage is specified on agency storage drawings, on sketches, and in narratives.

(3) Steel racks. Steel racks which are grounded may be used for storage of separate-loading shells, bombs, and other cylindrical objects of ammunition.

c. Aisles. Inspection aisles should not be maintained except when specific instructions to the contrary are issued by the controlling authority. Operating aisle widths in magazines should be adjusted to conform to widths required for specific types of available forklift equipment or other operational needs. Aisles should be provided for use of handling equipment, inventory, surveillance, ventilation, or as necessary to distribute the load within the floor capacity. Aisles should not be maintained solely for inventory purposes.

d. Care of ammunition in storage. Incoming ammunition should be inspected to determine its condition and whether adequate preservative protection has been applied. Those packages of ammunition which have been opened or are being returned to the activity as excess should be cautiously checked to determine further serviceablity and preservation requirements. Inspection of ammunition in storage should made to determine if the preservatives and protective measures are adequate. Proper preservation and cleaning methods are established and published by each military service.

e. Locator system. Locator records must be established at all military establishments where ammunition and explosives are stored. There should be two records established which can be cross-referenced. One is a record of each lot of ammunition and the location in which it is stored; the second record should be a planograph for each storage building.

f. Safety. The most important part of all ammunition handling operations is consideration for the safety of personnel, property, ammunition, and explosives. The controlling authority is responsible for insuring that safe practices are being observed in all operations that pertain to handling of ammunition and explosives. This line of responsibility reaches all the way to the individuals that handle the item. General instructions governing the storage and care of explosives should be posted in each magazine and building where ammunition and explosives are stored. These instructions are found in the Storage and Materials Handling manual (DOD 4145.19-R-1).

Section III. STORAGE OF HAZARDOUS COMMODITIES

5-7. COMBUSTIBLE MATERIALS

This section includes some of the more common hazardous commodities stored in military installations, but it is not intended as a complete listing. Storage and handling precautions to be observed with respect to other hazardous commodities are prescribed by the appropriate military service.

a. Carbon (lampblack). Carbon should be stored in barrels, steel drums, multiwall sacks, or kegs and should be kept dry. Carbon in dust form is a dangerous fire hazard but not spontaneously flammable.

b. Diphenylamine. Should be stored in wooden barrels, fiber drums, or kegs in a cool well-ventilated area. If diphenylamine is spilled on the skin, it should be washed off immediately.

c. Ester gum. Ester gum should be stored in tight wooden or steel barrels in a cool, well-ventilated area.

d. Fusel oil. Fusel oil should be stored in steel drums, tight wooden barrels, cans, or steel tanks. Fusel oil fumes are dangerous in empty tanks or closed compartments. The liquid is poisonous and care should be taken not to spill it on the skin.

5-8. FLAMMABLE LIQUIDS

Flammable liquids present a fire hazard that requires expert handling and storage techniques. It is important to segregate items which, when mixed with other substances, cause combustion.

a. Characteristics. Flammable liquids do not actually burn; the vapors from these liquids do the burning. The rate at which liquids vaporize varies with the vapor pressure of the liquid, and vaporization increases with the increase in temperature.

(1) Flashpoint. The flashpoint is the lowest temperature at which enough vapor is given off to form a flammable mixture of vapor and air above the surface of the liquid. Fig 5-1 gives the flashpoint of some of the materials commonly carried in the stock by the military services that require careful handling. When in doubt about the flammability of any item to be stored, you should consult with the officials in charge of safety and fire prevention.

(2) Fire point. The lowest temperature at which a liquid will give off enough vapors to continue burning after ignition is called the fire point. It is slightly higher than the flashpoint.

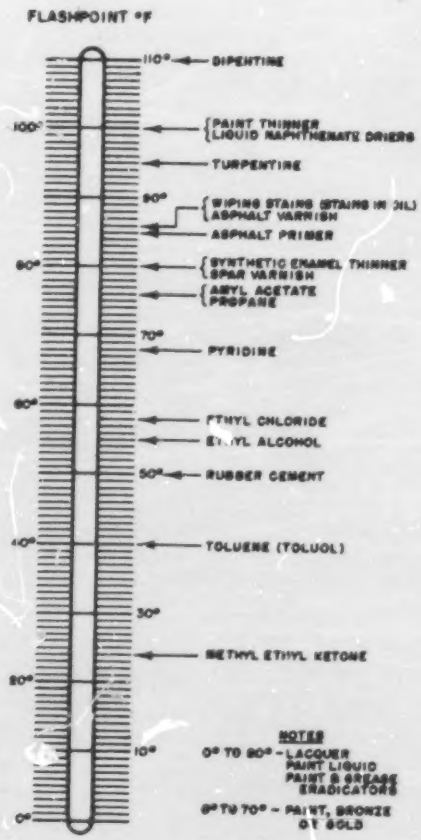


Fig 5-1. Flashpoint of representative materials.

b. Storage. Flammable liquids should be stored in fire-resistant warehouses. They should not be stored in general warehouses except in emergencies. However, when flammable liquids must be stored in general warehouses, the following should be observed:

(1) Storage should be at the end bays of the warehouse, if suitable access is available to end bays by doors and windows.

(2) Containers should be identified in accordance with Interstate Commerce Commission regulations.

(3) Containers should be checked for leaks before being placed in storage and inspected from time to time in storage. Leaking containers must be removed immediately.

(4) Curbs should be provided to prevent the flow of spilled liquids to other sections of the warehouse.

(5) Flammable liquids should not be stored in any area where flammable vapors from leaks or other sources may be ignited by sparks, flame, or extreme heat. Adequate ventilation should be provided for any area where flammable vapors or gases may be present.

5-9. COMPRESSED GASES

a. Characteristics. Compressed gas is one which is confined under a presure greater than atmospheric pressure. Because compressed gases are under pressure, such gases must be handled with extreme care. Compressed-gas cylinders must never come in contact with fire, sparks, or electrical circuits. The explosion of a steel container would have the same effect as a bomb explosion.

b. Storage. In the storage of compressed gases, cylinders of oxygen gas must be stored in separate rooms from other compressed gases and highly flammable material. Certain compressed gases in cylinders such as acetyline, chlorine, sulphur dioxide, and liquefied petroleum should be stored upright to prevent damage to valves and to prevent separation of ingredients. Cylindrical units stored in horizontal position must be blocked or separated by notched spacers. Figures 5-2 and 5-3 illustrate the correct methods of storing cylinders.

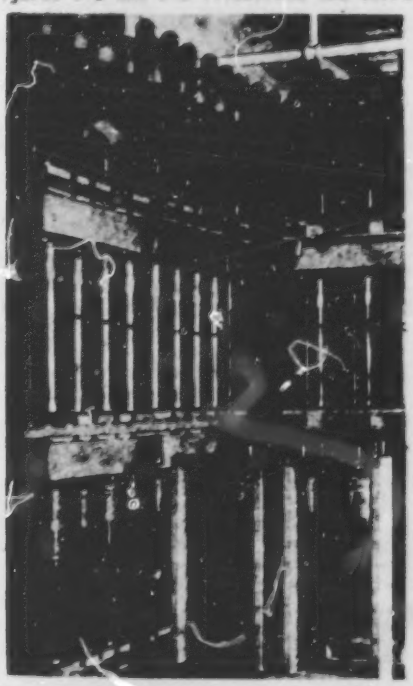


Fig 5-2. Vertical storage of acetylene gas cylinders.

Fig 5-3. Horizontal storage of cylinders using notched spaces.

5-10. RODENTICIDE POISONS

a. Calcium cyanide, fumigant dust. Calcium cyanide must be handled with extreme care. On contact with water this item gives off a deadly poisonous gas which smells like peach blossoms. The storage area for calcium cyanide must be isolated from flammable and combustible supplies and acids. Only packages in good condition are placed in storage and the storage area must not be subject to dampness or excessive moisture. This item should be stored under lock and key in a section of a flammable-storage warehouse or an isolated section of a warehouse, protected by a barrier of wire fencing or other materials equivalent to wire fencing. Containers must be examined at least once a week. If an area is suspected of contamination from leaking containers, it will be entered ONLY for emergency reasons and then only by personnel wearing air-supplied rescue-breathing apparatus. Rubber gloves must be worn when handling packages of calcium cyanide.

b. Zinc phosphide. On contact with water or acid, this item gives off a deadly flammable phosphide gas which can ignite spontaneously. Zinc phosphide must be stored in an isolated area away from flammable and combustible supplies and acids. This poison reacts violently with oxidizing agents and gives off a garlic-like odor. Contaminated areas are entered ONLY for emergency and then only by personnel wearing air-supplied rescue-breathing apparatus. This item should be stored in a flammable-storage warehouse or an isolated section of a warehouse protected by a wire fence barrier or a barrier made from equivalent material.

c. Locked storage items Locked storage poisonous items are poisons requiring maximum security as protection to personnel. An area that can be locked should be used for the storage of the following poisonous items:

(1) Calcium cyanide

(2) Sodium monoflouacetate

(3) Thallous (thallium) sulfate

(4) Cuprocyanide (copper cyanide)

(5) Potassium cyanide

(6) Sodium cyanide

(7) Barium hydroxide

(8) Strychnine

(9) Zinc phosphide

Section IV. MISCELLANEOUS COMMODITIES

5-11. BATTERIES

a. Dry cell. Batteries can be stored on pallets, in bins, or in racks depending on the quantity and type to be stored. Batteries removed from their original containers should never come in contact with steel or other metal objects which can cause short circuiting or discharging. Since dry batteries are a perishable commodity, they should be stored in refrigerated spaces or in warehouses having controlled temperatures. The most desirable temperature is 30°F; however, spaces having temperatures between 35° F and 50° F with relative humidity of 50% to 80% may be used for normally moving stocks. For long term storage, dry batteries should be stored in areas having temperatures as close as possible to -30° F, but not lower than this, and no higher than 30° F. The expiration dates are filled in by the issuing activity at the time of issue.

b. Lead acid

(1) Charged and dry. Batteries received charged and dry should be stored in a dry area not subject to extreme temperature changes. These can be stored in bins, racks, or palletized loads. The vent plugs should be kept tightly closed.

(2) Charged and wet. These are stored fully charged and ready for use. Equalizing charges are given normally at 30-day intervals. The individual activity determines the frequency of charges.

5-12. PHOTOSENSITIZED MATERIALS (FILM AND PAPER)

Unexposed photosensitized materials are perishable and deteriorate with age. The required relative humidity for sensitized materials ranges from 30% to 60% with 50% considered ideal and temperatures of 50° F or lower. Refrigerated space should always be used for proper storage of photosensitized materials. Immediately upon receipt, this type of material must be stored under specific conditions. The material should be placed on shelves, dunnage, or pallets, allowing sufficient space between packages for adequate circulation of air. Refrigerators used for photosensitized material must not be used for the storage of food or water. Regardless of the level of preservation and packaging, these materials must not be stored in damp basements, on damp ground, near steampipes, boilerrooms, windows, or top floors of uninsulated buildings.

5-13. INTERNAL-COMBUSTION ENGINES

Engines should be stored in a clean, dry area which is not subject to extreme temperature changes. Pallets, skids, or racks should be used to store engines. The correct dunnage can be determined by the type of engine, method of pack, and quantity to be stored. One important fact to remember is: engines in storage are not to be cranked or turned over in storage because to do so would damage the coating of preservative compound. Engines stored in nondehumidified storage must be treated periodically with preservative compounds. Periodic checks in nondehumidified storage should be made on 5% of the engines on hand at intervals of approximately 6 months. Engines in dehumidified storage do not require as much attention and normally an annual check of 1% of the engines in stock is sufficient.

5-14. LUBRICATING OILS AND GREASES

Oils and greases should be stored in a fire-resistant, sprinkled building, or warehouse. If a general-purpose warehouse is used, storage should be in end zones with immediate access to exterior doors and separate from blocks of other materials by aisles. These separating aisles should not be less than 3 feet wide. Containers should be inspected before being placed in storage and periodically thereafter. Those containers which show signs of leaking or excessive corrosion, or are otherwise unfit, should be removed from storage and their contents transferred to a satisfactory container. Oils and greases in bulk storage should be palletized, and the height of stacks and size of storage blocks must comply with regulations governing load capacities and height of ceiling.

5-15. PAINTS

Where facilities are available, paint and paint materials should be stored in fire resistant storage buildings. If space is limited, supplies bearing Interstate Commerce Commission red labels should be given preference. If the general storage warehouse is to be used for storage of paints, the end zones are used, and the paint stored must be be segregated from highly combustible supplies. Containers are inspected prior to storage to check for leaks. The containers should be palletized and good ventilation provided. The containers should be so placed in storage that they can be issued on first-in first-out basis. Paints in general should be stored in a cool dry place. Nonfire-resistant unsprinkled warehouses should be used only as last resort.

5-16. TIRES AND TUBES

Light, heat, air and motion, dust, and dirt are factors that contribute to deterioration of tires and tubes. Tires and tubes should be stored in cool, dry warehouses and should be protected from light, especially sunlight to prevent checking. Skylights and windows should be painted with sun-filtering paint to reduce the amount of light to a minimum. Tires should not be stored in the vicinity of radiators or other sources of heat. Storage temperatures should not exceed 70° to 80° F. Tires should be stored in a vertical position because stacking in piles distorts the tire. Tires should be stored on standard pallets with frames and special storage racks. Serviceable used tires should be handled and stored in the same manner as new tires. Tubes require more careful handling than tires. New tubes should be left in their original containers. Tubes not packaged should be stored in a cool, clean, and dry place, well covered and protected from elements that cause deterioration. Tubes should not be inflated in storage and must be piled carefully so that weight does not cause stretching along the folds.

5-17. FIBER ROPE

Heat and moisture causes deriorating in fiber rope; therefore, it should always be stored in a cool, dry, and covered space. When the rope is manufactured, it is impregnated with oil which adds 10% to its weight. As the oil leaves the rope, the rope deteriorates. Rope that has been in storage for a long period of time should be weighed prior to shipping. When properly stored, rope loses its strength because of age at about 2% per year. Life of the rope will be shortened further by the presence of mold, acid, or water. Ropes must not be stored near acid, batteries, chemicals, or alkalies, and it must have adequate ventilation and be well protected from direct sun rays. Prior to storage, it should be checked to insure that it is not wet.

5-18. PACKAGED PETROLEUM PRODUCTS

a. Use of drums. As a general rule, storage of filled drums should be held to the absolute minimum needed to meet ordinary requirements. When bulk facilities are available, it is safer to store empty drums, provide adequate drum-filling equipment, and store only enough filled drums to meet immediate requirements.

b. Outdoor storage location. A level site should be selected that is not adjacent to a congested area, and where the contour of the terrain permits immediate runoff of surface water through a network of open ditches. DRAINAGE TO ANY SEWER SYSTEM IS PROHIBITED. Areas with cinder base, marsh, or waste land overlaid with peat and usually more or less wet should not be used when other, more suitable sites are available.

c. Outdoor storage of 55-gallon drums. The drums should be placed horizontally in double rows, butt to butt, with the vents facing outward. If stored on ends, the drums tend to collect rainwater, which rusts the tops of the containers and may seep through and contaminate the contents. For low flashpoint products, the rows of drums should not extend more than 35 drums long. The second tier will contain 34 drums and the third tier 33 drums, thus the double row will contain a total of 204 drums. To insure drums against damage from rolling, cross-bracing every fifth drum is required. In addition, the ends of bottom tiers must be braced. The bottom tier of drums should be placed on not less than two inches by six inches (or comparable) dunnage running parallel to the length of the rows.

(1) Palletized stacking. Occassionally drums may be placed on special drum pallets, which allow four 55-gallon drums to be placed on their sides on each pallet. Pallets must be constructed to prevent drums from rolling. Pallets are stacked one over the other with drum closures toward aisles. No end braces are necessary for palletized stacks.

(2) Aisles. Aisles between double rows will normally be ten feet. The aisles may be reduced to four feet where materials handling methods permit.

(3) Dikes. Each major storage division that contains products with a flashpoint of 80° F or below must be surrounded by a dike at least 18 inches high on level terrain. This is to prevent burning liquids from flowing to adjacent division, buildings, storage areas, or waterways. In any case, the dike must be sufficient to retain all of the liquid contents of drums stored in the division.

d. Storage of 5-gallon military gasoline containers. Prior to storage, you must inspect for leakage and for proper marking of the containers. Check for the date of filling so that the oldest product can be issued first. To conserve space and provide stability of stacks, filled cans should be stacked in pyramids, unless cans are palletized. To stack cans in a pyramid, lay out a 50-foot square and build a partial flooring for the first tier of cans by laying out rows of 2-by 6-inch lumber or other comparable dunnage. Beginning at one corner of the square, place six cans side by side along one side of the square. Place cans six inches from edge of dunnage and allow 1/4 in expansion space between the cans. Place a row of six cans side by side with backs facing the aisle along the adjacent side to form an "L". Place a second tier of cans on top of the first. Indent the second tier on both sides approximately 3 1/3 inches so that each can in the tier rests on three or four cans. Place a third and fourth tier on the stack, indenting each tier. Do not stack cans more than four tiers high. Continue building the pyramid outward until the entire 50-foot square is completed. There should be a total of not more than 13,370 cans in the section.

e. Storage of empty containers. Empty containers must be protected from mechanical damage due to careless handling and from contamination of their interiors by dirt, water, and other matter. Tightly closed containers will greatly retard interior corrosion. New or reconditioned containers received for storage probably will not have product markings on them. These containers should be inspected periodically to insure their usability. Containers with evidence of interior or exterior corrosion should be removed for reclamation. Stacking of empty 55-gallon drums should be in accordance with methods prescribed by the military services. Empty 5-gallon gasoline cans may be stacked in the same manner as full cans but without limit to the height of stacks. Occasionally empty 5-gallon cans are strapped side by side in groups of five. Groups may be placed on pallets with the cans resting on their bases or their sides. Groups may also be stored without the use of pallets, but dunnage must always be used between the bottom tier and the ground, and the containers should not be stacked as high as containers stacked by other methods unless shoring is placed at the ends of each row to prevent slipping. Filler plugs must be tightened before cans are stacked.

f. Quality surveillance. A vigilant quality surveillance program is necessary to insure a supply of clean specified products to the using field units. Many things can happen to petroleum products to affect their quality and performance value after delivery and during storage and dispensing at the depot. Careless handling, contamination, exposure to abnormal temperatures, confusing of marking, or inefficient control of stock can cause leakage and spoilage. Packaged products opened for spot checking or quality surveillance tests should be consumed as soon as possible. When this cannot be done, the containers should be reclosed tightly and marked as having been previously opened. Inefficient supply control of products can result in spoilage and loss. The "first-in first-out" issue procedure will reduce spoilage caused by long storage.

Section V. SUBSISTENCE

5-19. PERISHABLE ITEMS

a. General. All chilled and frozen subsistence is highly perishable and subject to rapid deterioration when improperly stored. Storage at temperatures which are too high or too low, under unfavorable conditions of humidity, and in the absence of proper air circulation will result in rapid spoilage and loss of the product. Storage temperatures for all frozen subsistence items must not be above 0° F. Products should be stacked on pallets in storage with a 4-inch wall clearing and a 2-foot ceiling clearance to provide for air circulation.

b. Storage.

(1) Meat, meat products, and poultry. Proper air circulation is the key to keeping the temperature in all parts of meat storage spaces at the recommended level. Meat must not be stacked on the floor, but should be stacked on pallets to allow free circulation of air under all items stored in the storage space.

(2) Quick-frozen fruits and vegetables. Upon delivery, quick frozen vegetables and fruits should be transferred promptly to a low-temperature storage space. Temperatures of the load should be checked upon arrival by taking temperature readings of cartons selected from top layers inside the shipping containers. If the temperature of the product is higher than the freezer-room temperature, shipping cases should be scattered loosely about the room on handtrucks or on pallets on the floor with plenty of room between individual cases to permit rapid lowering of the product temperature to freezer-room temperature. If the product temperature upon delivery is the same as below the temperature of the freezer room, the cases should be stacked compactly immediately.

(3) Dairy products and eggs. Air in the cold-storage room must be kept fresh. The room must be kept clean and air circulating slowly. Ordinarily the air circulation can be provided by use of pallets on the floor and proper stacking of various lots. Egg cases should not be stacked more than 5 cases high to avoid pressure damage. Storage life of persihable subsistence is explained in the Storage and Materials Handling manual (DOD 4145.19-R-1).

5-20. SEMIPERISHABLE ITEMS

a. General. The term semiperishable subsistence refers to food items that are canned, dried, dehydrated, or processed to the extent that such items may under normal conditions be stored in nonrefrigerated storage. Although semiperishable subsistence is not subject to spoilage as fast as perishable subsistence, spoilage can and does occur if the products are mishandled, improperly stored, or kept in storage for an excessive period of time.

b. Storage. Where sharply changing temperature and high humidity prevail, the lack of proper ventilation may cause excessive high temperatures in the storage room. Proper ventilation is one of the most important factors in protecting foods. Careful, correct storage methods not only prevent damage to items in storage but insure speed and efficiency in the receipt, handling, and issue of such items. Shipments should be marked and segregated so that the oldest lots as packed are issued first, unless the newer lots show evidence of deterioration or spoilage. It is important to remember that the length of storage should be estimated from the date of packing and not from the date of receipt. Care should be taken not to stack items so high that their weight is liable to burst or crush the bottom layers. Pallets are used to raise subsistence off the floor and individual lots should be piled in such a way as to permit the circulation of air. All items should be properly cross-stacked to keep the stack solid and prevent it from falling.

c. Physical environment factors

(1) Freezing. Dry products such as grain, flour, sugar, starch, and cereals ordinarily are not hurt by freezing. Emulsion such as canned cheese, butter, and mayonnaise will be destroyed by freezing even though the food is not spoiled.

(2) Heat. High temperatures in storage can cause bacterial growth and mold or insect infestation. High temperature is the chief cause of rapid spoilage in canned foods and should be controlled when possible by providing proper ventilation.

(3) Moisture (humidity). High humidity causes growth of bacteria and mold. High humidity causes such quick-moisture-absorbing products as flour, sugar, and salt to cake and become hardened.

(4) Ventilation. In storage areas where temperatures fluctuate and there is a high humidity, the lack of proper ventilation can cause a high temperature in the storeroom and in extreme cases it may become necessary to open doors and use fans to provide air circulation to reduce heat. Proper ventilation is one of the most important factors in protecting foods, especially in tropical areas.

(5) Light. Damage from light is restricted to products that are packed in glass or transparent containers. Exposure to light may cause flavor changes in foods containing oils and fats.

Storage life for semiperishable subsistence items is outlined as a guide in the Storage and Materials Handling Manual(DOD 4145.19-R-1).

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30.3h

WAREHOUSING OPERATIONS

Lesson 5

Storage of Special Commodities

STUDY ASSIGNMENT: MCI 30.3h, Warehousing Operations, Chap 5.

LESSON OBJECTIVE: Upon successful completion of this lesson, you will be able to identify the care-in-storage and proper procedures for correct storage of the special commodities most common to the Marine Corps distribution system.

WRITTEN ASSIGNMENT:

A. Multiple Choice: Select the ONE answer which BEST completes the statement or answers the question. After the corresponding number on the answer sheet, blacken the appropriate box.

Value: 1 point each

1. Before placing incoming lumber in storage, it must be checked thoroughly for

a. correct binding.
b. correct markings.
c. fungus and moisture content.
d. size of drafts.

2. What is the average height of lumber drafts?

a. 2 to 6 ft
b. 2 to 5 ft
c. 3 to 6 ft
d. 3 to 4 ft

3. Which lumber characteristic determines the width of a draft of lumber?

a. Width
b. Length
c. Thickness
d. Moisture content

4. Which factor is used to determine if stickers are to be used between each layer of lumber?

a. Moisture content
b. Height of the stack
c. Length of lumber
d. Width of lumber

5. Marking of each draft of lumber should include all of the following information EXCEPT

a. board feet.
b. stock number.
c. width of draft.
d. date received.

6. Which is the preferred binding material for binding drafts of lumber?

a. Round steel galvanized wire
b. Flat steel strapping
c. Flat aluminum strapping
d. Flat tin strapping

7. What is the final step taken prior to moving lumber drafts to final storage?

a. Stacking
b. Stickering
c. Marking
d. Binding

8. Which is the correct marking of lumber received on the 196th day of 1976?

a. 15 Jul 1976
b. 196/76
c. 196-1976
d. 6196

9. Besides the equipment used for stacking, which other factor determines the actual layout of a lumber yard?

a. Size and shape of available area
b. Type of lumber to be stored
c. Quantity of lumber to be stored
d. Length of lumber to be stored

10. To increase air circulation, how wide should the aisles be between rows of stacked lumber?

a. 2 to 3 feet
b. 6 to 8 feet
c. 12 to 18 feet
d. 24 to 30 feet

11. Lumber which cannot be stored in enclosed places must have at least adequate roofing. To afford maximum protection from the weather, a roof should extend 12 to 18 inches at the end of the stack and _____ inches over the sides.

a. 24
b. 18
c. 12
d. 6

12. For long-term open storage, which would require special roofing?

a. Oak lumber
b. Frame pallet
c. Box pallet
d. Stickering material

13. The end-use moisture requirement for lumber stored in open sheds should be between _____ percent.

a. 6 and 12
b. 8 and 12
c. 12 and 19
d. 19 and 23

14. Which storage facility is used for the storage of plywood?

a. Closed shed
b. Open shed
c. Open lot storage
d. Special warehouse

15. Which facility is most commonly used for storage of ammunition and explosives?

a. Flammable warehouse
b. Dehumidified warehouse
c. Open storage
d. Igloo

16. Which magazine is located so the front of one igloo without a door barricade is toward an earth-covered side of another igloo?

a. Igloo magazine barricaded
b. Igloo magazine unbarricaded
c. Above-ground magazine
d. Special-type magazine

17. Which commodity should NOT be stored in open storage?

a. Lumber
b. Black powder
c. Empty drums
d. Vehicles

18. Which type of magazine should be used for the storage of bombs with high explosive components?

a. Earth-covered barricaded
b. Earth-covered unbarricaded
c. Open storage
d. Above-ground

19. Separate-loading shells should be stored in

a. earth-covered magazines.
b. open storage.
c. above-ground storage.
d. fire-resistant warehouses.

20. Which storage aid should be used for storage of carton-packed or loose ammunition?

a. Steel racks
b. Metal bin units
c. Box pallets
d. Standard pallet

21. The most important part of all ammunition handling operations is

a. storage aids.
b. equipment.
c. locator system.
d. safety.

22. Which commodity should be stored as hazardous material?

a. Fusel oil
b. Lead acid batteries
c. Photosensitized film and paper
d. Dry-cell batteries

23. The lowest temperature which enough vapor is given off to form a flammable mixture of vapor and air above the liquid is called the

a. fire point.
b. flashpoint.
c. melting point.
d. boiling point.

24. Which item has a 100° F flashpoint?

a. Paint thinner
b. Ethyl chloride
c. Ethyl alcohol
d. Rubber cement

25. If flammable liquids must be stored in a general warehouse, in which part of the warehouse should they be stored?

a. End bays
b. Center bays
c. Center aisles of each bay
d. Bays closest to the office

26. Which compressed gas must be stored in separate rooms from other cylinders of compressed gases?

a. Sulphur dioxide
b. Chlorine
c. Acetylene
d. Oxygen

27. Containers of calcium cyanide must be examined at least once each

a. day.
b. week.
c. month.
d. quarter.

28. Which item should be stored in an isolated section of a warehouse with a protective wire barrier?

a. Zinc phosphide
b. Rubber cement
c. Acetylene
d. Oxygen

29. Which item is considered a "locked storage item"?

a. Zinc phosphide
b. Acetylene
c. Liquefied petroleum
d. Chlorine

30. What is the maximum satisfactory temperature at which dry-cell batteries may be stored?

a. 60° F
b. 50° F
c. 40° F
d. 30° F

31. For storage of dry-cell batteries, what is the most desirable storage room temperature?

a. 30° F
b. 35° F
c. 50° F
d. 60° F

32. Temperatures in tire storage areas should not exceed

a. 40° to 50° F.
b. 50° to 60° F.
c. 60° to 70° F.
d. 70° to 80° F.

33. Which commodity should be stored in a cool and dry warehouse?

a. Dry-cell batteries
b. Tires and tubes
c. Perishable subsistence
d. Photosensitized materials

34. What percentage of engines stored in dehumidified storage should be checked annually?

a. 1
b. 2
c. 3
d. 4

35. Fiber rope must not be stored near

a. tires.
b. tubes.
c. engines.
d. batteries.

36. Which commodity should be stored in a cool dry warehouse and protected from direct sun rays?

a. Cable
b. Lumber
c. Dry-cell batteries
d. Fiber rope

37. Which is a true statement concerning outdoor storage area for petroleum products?

a. Storage area must have a cinder base.
b. Storage area should be located near wasteland.
c. Drainage into any sewer system is prohibited.
d. Drainage ditches must be connected to a sewer system.

38. In storage of frozen subsistence, how much ceiling clearance should be allotted for air circulation?

a. 6 in
b. 8 in
c. 2 ft
d. 3 ft

39. Which factor can cause rapid spoilage of frozen subsistence?

a. Improper air circulation
b. Loose stacking
c. Improper lighting
d. Quick freezing

40. In frozen storage, the purpose of the 4-inch wall clearance is to provide

a. an inventory aisle.
b. an inspection aisle.
c. air circulation.
d. pest control.

41. Storage temperatures for all frozen subsistence must NOT be above

a. 0° F.
b. 5° F.
c. 10°F.
d. 25° F.

42. The length of storage for semiperishable products is estimated from the date of

a. receipt.
b. shipping.
c. packing.
d. actual storage.

43. Which factor causes canned butter to be destroyed?

a. Moisture
b. Heat
c. Freezing
d. Light

44. Which factor causes rapid spoilage in canned foods?

a. Heat
b. Light
c. Moisture
d. Air

Note: Questions 45 to 52 require you to identify the storage facility (a-e below) in which the respective commodity should be stored.

a. Refrigerated space
b. Closed shed
c. Barricaded igloo
d. Controlled-humidity warehouse
e. Fire-resistant building or warehouse

45. Dry-cell batteries.

46. Well-seasoned lumber.

47. Photosensitized materials.

48. Paints.

49. Lubricating oils.

50. Bombs with HE components.

51. Plywood.

52. Molding and frame stock lumber.

Total Points: 52

* * *

Chapter 6

PRESERVATION, PACKAGING, AND PACKING

6-1. INTRODUCTION

Rough handling and exposure to extreme climatic conditions are two common problems to be faced in the moving and storing of military supplies and equipment. In view of this, the Armed Forces have given much time and thought to the development of packaging methods to protect materials against deterioration and damage in any climatic area. Supplies that are ruined or damaged because of faulty packaging can have a disastrous effect on a tactical situation, since one failure in the logistical effort is one mistake too many. Time will not permit the requisitioning or replacement of damaged items when it is a matter of life or death. In general, MCO P4030.36, sets forth the objectives that all Marine Corps material will be afforded the degree of preservation, packaging, and packing required to prevent deterioration or shipment damage due to hazards to which material is subjected during shipment, handling, and storage.

6-2. PROTECTION OF SUPPLIES DURING HANDLING, SHIPMENT, AND STORAGE

a. Procedures

(1) Protection requirements. The nature of an item determines the type and extent of the protection required to meet shipping, handling, and storage conditions.

(2) Selection of levels of protection. The selection of appropriate levels of protection depends on the conditions expected during shipment, handling, and storage of the material. The guidance outlined in MCO P4030.36 is designed to assist in the selection of levels which will meet specific shipping, handling, and storage conditions.

b. Level of protection

(1) Level A - Maximum Protection. The degree of protection required against the most severe conditions known or anticipated to be encountered during shipment, handling, and storage. Items awarded preservation, packaging, and packing level A are designed for direct exposure to all extremes of climatic, terrain, operational, and transportation environments without protection other than that provided by the package and packing. The conditions to be considered include but are not limited to the following:

(a) Multiple rough handling during transportation and in-transit storage from manufacturer to user.

(b) Shock, vibration, and static loading.

(c) Environmental exposure during shipment or transit where port and warehouse facilities are limited or nonexistent.

(d) Loading on shipdeck, transfer at sea, helicopter delivery, and offshore or over-the-beach discharges to the ultimate user.

(e) Special package and pack features for field and combat operations.

(f) Extended open storage in all climatic zones.

(g) Static loads imposed by stacking.

(h) Final destinations where handling and storage conditions are unknown.

(2) Level B - Intermediate Protection. The degree required for protection under conditions known to be less severe than those requiring level A but more severe than those for level C. In general, the following criteria will determine the requirement for level B:

(a) Multiple handling during transportation and in-transit storage.

(b) Shock, vibration, and static loading of shipment worldwide by truck, rail, aircraft, or ocean transport.

(c) Favorable warehouse conditions for extended periods.

(d) Stacking and supporting superimposed loads during shipment and extended storage.

(3) Level C - Minimum Protection. Minimum protection will be used whenever the prevailing logistics system permits use of this degree, based upon the considerations stated within. In general, the following criteria will determine the requirement for this degree of protection.

(a) Use or consumption of the item at the first destination.

(b) Limited shock, vibration, and static loading during the limited transportation cycle.

(c) Favorable warehouse environment for temporary periods (less than six (6) months).

(d) Effects of environmental exposure during shipment and in-transit delays.

(e) Item characteristics which require no special or peculiar preservation, packaging, or packing provisions.

(f) Stacking and supporting superimposed loads during shipment and temporary storage.

(4) Industrial Packaging. Industrial packaging will be used, whenever logistics conditions justify and may be used to satisfy any degree of protection when the technical design details of the package meet all conditions of the level of protection specified. Industrial packaging must protect items against physical and environmental damage during shipment, handling, and storage. In general:

(a) Items will be given the degree of protection normally employed by the supplier to afford protection against corrosion, deterioration, and damage during shipment.

(b) Protection will be that used for distribution directly to a using customer or for subsequent redistribution as required.

(c) Wholesale assembly bulk-type packaging practices such as those used in interplant and interplant shipments to jobbers are not acceptable unless they are the usual trade practices for selected commodities.

(d) The technical requirements will be incorporated in standardization and acquisitions documents where applicable.

(e) Specific industry standards such as Electronic Industries Association or Aerospace Industries Association Standards may be used, where appropriate.

(f) ASTM 3951-82 is an acceptable reference document for industrial packaging. Well defined individual company standards meeting the minimum requirements of ASTM 3951-82 may also be used.

Figure 6-1 illustrates the three levels of protection afforded in packaging of items of supplies.

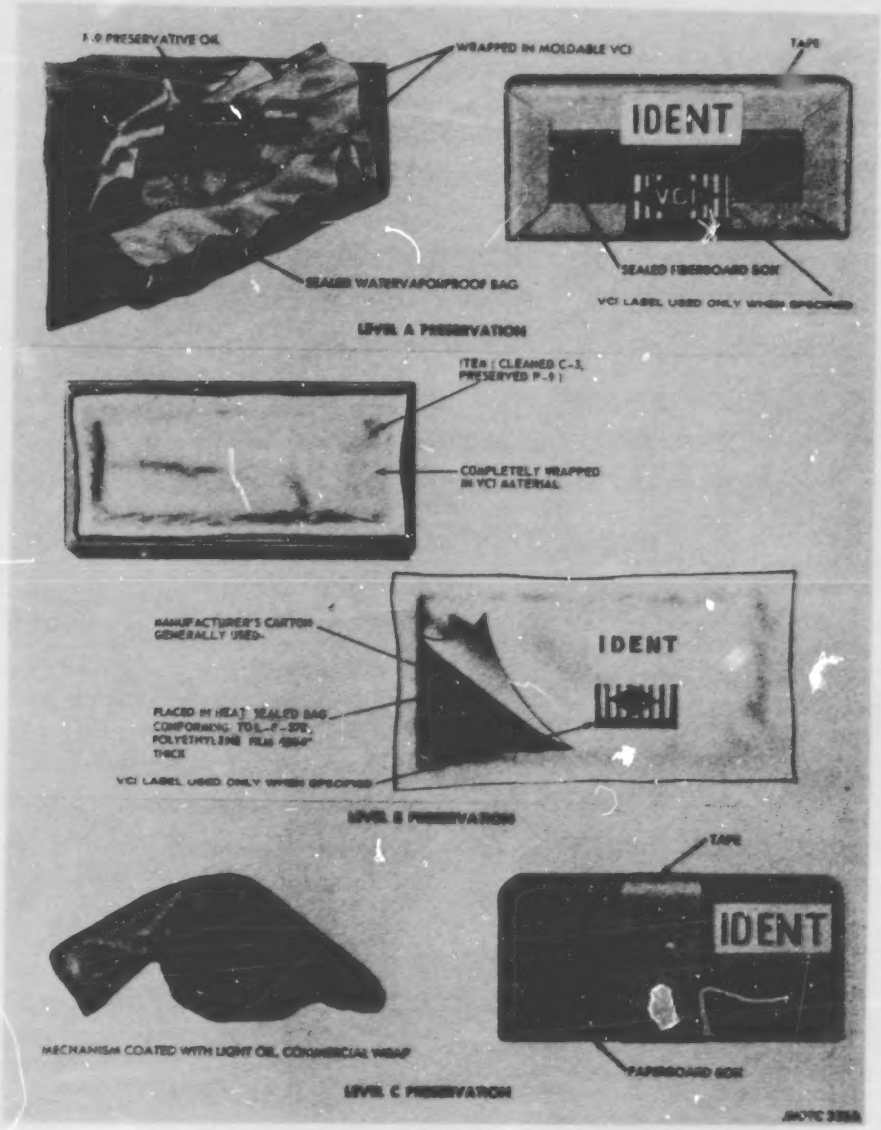


Fig 6-1. Levels of preservation and packaging.

6-3. PACKAGING OPERATION

a. Cleaning process. Thorough cleaning by an approved process is the first essential operation in any effective packaging cycle. Contaminants or contaminating residue, if left on the surface of an item, will render all subsequent packaging ineffective. The approved cleaning process and materials to be used are prescribed in MIL-P-116_. There is no single cleaning process which will be applicable to all items and surfaces.

(1) Conditions governing the process choice. Unless the proper process is applied, more harm than good may result. The choice of a cleaning process will depend on the following:

(a) Material composition of the item.

(b) Nature of the item's surface.

(c) Complexity of construction.

(d) Nature of contaminant to be removed.

(e) Portion or area of the item requiring cleaning.

(f) Degree of contaminant present.

(g) Availability of cleaning materials and equipment, and hazards involved.

(2) Cleaning applications. Items should be cleaned by a process or a combination of processes which will accomplish thorough cleaning without damage.

(a) Cleaning solvent. Items requiring this type of cleaning should be cleaned in cleaning solvent and drained. The initial cleaning, when other than pressure spray is used, must be followed by a secondary cleaning in another tank of clean solvent. Items with critical surfaces must be cleaned in perspiration and fingerprint remover. First clean the items with cleaning solvent then immerse them in fingerprint remover and agitate for 2 minutes to remove fingerprints. Rinse in a second tank of clean solvent for at least 1 minute to remove the fingerprint residue. After rinsing is completed, remove the items and allow excess solvent to drain off.

(b) Vapor degreasing. Cleaning with this process applies to items of simple construction when the contamination consists of oil, grease, or other contaminants which are soluble in vapor solvent or readily removed.

(c) Alkaline cleaning. This process of cleaning is the oldest and most widely used system for cleaning metal. It is accomplished by immersion, soaking, or pressure spray of alkaline cleaner MIL-C-5543_, or P-C-436_, and rinsing in clean water above 180°F. For alkaline immersion cleaning, lower the items into the hot alkaline solvent and soak 2 to 10 minutes depending on how badly they are contaminated. Then remove the items and place them in the hot rinse for approximately 1 minute.

(d) Electrocleaning. Items are immersed in a solution of platers electrocleaning compound (P-C-535_), making the items an element of an electrochemical cell. The electrocleaning process is followed by rinsing items in clean hot water above 180°F.

(e) Emulsion cleaning. Items are cleaned by pressure spray or immersion soak in grease-cleaning solvent of emulsion-type compound P-C-444_ at room temperature. Cleaning is followed by a rinse in hot water above 180°F.

(f) Steam cleaning. The steam-cleaning process may be used by subjecting the items to steam alone or to steam with added steam-cleaning compound P-C-437_. If the steam-cleaning compound is used, follow with cleaning by steam alone.

(g) Abrasive cleaning. Abrasive cleaning breaks down solid, tightly adhearing contaminants on item surfaces by blasting them at high velocity and impact with hard or soft granulated particles.

b. Drying procedure. It is necessary to dry parts immediately after cleaning to remove cleaning solvents and residual moisture. The selection of the drying procedure to be used is at the discretion of the officer in charge unless otherwise directed. The authorized drying procedures are prescribed in paragraph 3-3 of MIL-P-116_, and detailed application techniques are found in MCO P4030.31_.

c. Preservative. A preservative is defined as "a material which, when applied to another material, will protect the latter from deterioration." To prevent deterioration, preservative compounds which form a coating around the items are needed to protect them. The application of preservative should follow the cleaning and drying operation as closely as possible and should be scheduled so the overnight exposure of unpreserved items is avoided. Preservatives are classified into two groups: those for metal and those for nonmetals.

(1) Preservatives for nonmetals may be applied at the time of manufacture or later. They are intended to provide protection to items that are subject to deterioration by handling, dryness, aging, fungus growth, rotting etc. Examples of these are moistureproofing and fungus-proofing materials and wood, leather, and textile preservatives.

(2) Preservatives for metals are classified as either permanent or temporary.

(a) Permanent preservatives for metals are normally applied at the time of manufacture of the item. They do not need to be removed before the item is used.

(b) Temporary or P-type preservatives for metals are applied after manufacture to items with corrodible surfaces. They are generally oily or greasy in nature and usually must be removed before putting the item into use. Table 6-1 illustrates the groups of temporary P-type preservatives.

Table 6-1. P-type Metal Preservative Groups

GROUP 1	GROUP 2	GROUP 3	GROUP 4
Thin film, solvent cut-back, cold application	Petrolatum base, hot application	Oils, rust-inhibiting, cold application	Special purpose, cold application
P-1, P-2, P-3, P-19 P-21	P-6	P-7, P-9, P-10, P-15, P-17 P-20	P-11, P-14, P-18

d. Method of unit protection. The proper application of the methods and materials of unit protection will help to insure that cleaned, dried, and preserved items remain in a usable condition after overseas shipment or long-term storage.

(1) Terms and definitions.

(a) Unit protection. That protection given to an item by the use of appropriate wrappings, cushioning interior containers, and marking for identification, preceded by an necessary cleaning, drying, and application of preservatives.

(b) Unit package. A unit package is the first tie, wrap, or container applied to a single item or multiple thereof or to a group of items, preserved or unpreserved, which involves a complete and identified package.

(c) Intermediate package. An intermediate package is an interior container which contains two or more identical unit packages and bears adequate identification of the contents.

(2) Factors governing the selection of the method of unit protection. These four factors govern your selection of the method of unit protection:

(a) Composition of the item. Whether the item is metal or nonmetal.

(b) Nature of the item. Does the item have a critical or noncritical surface and what is the effect of water and vapor on the item.

(c) Construction of the item. Whether the item is simple or complex in construction.

(d) Level of packaging required. Whether the item is to be packaged level A, B, C or industrial packaging.

(3) Basic methods of unit protection. The methods of preservation are established by Military Specification MIL-P-116 and consist of six basic methods (fig 6-2). The basic methods are:

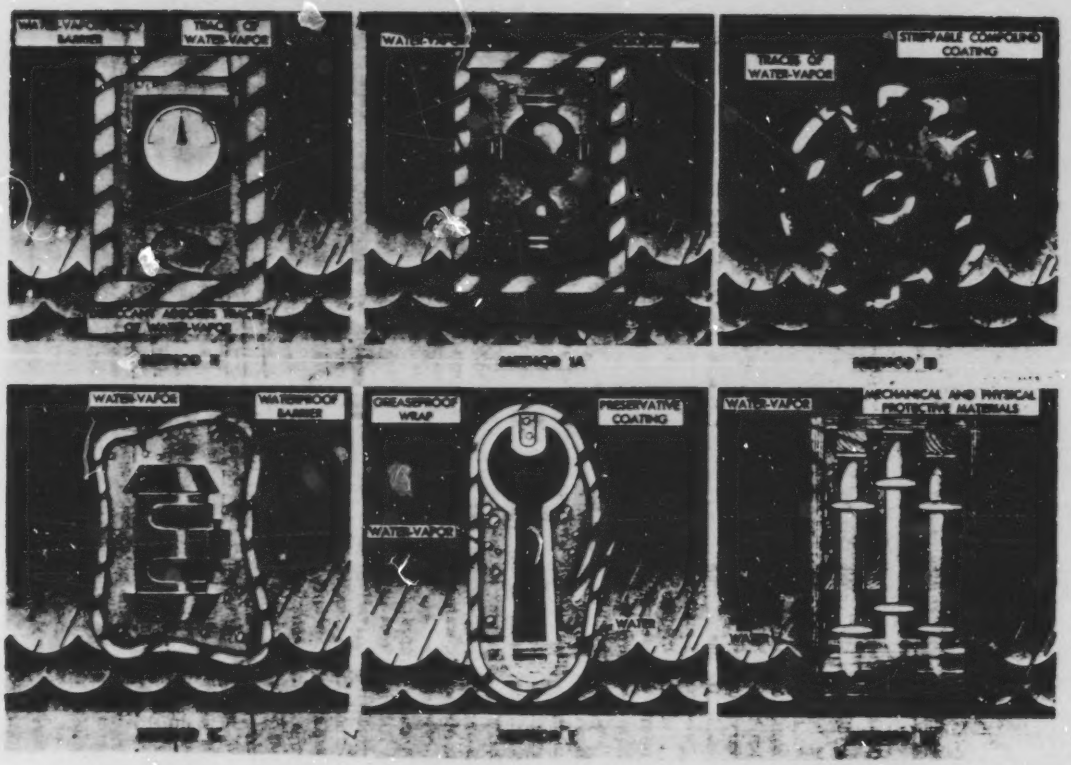


Fig 6-2. Concept of basic methods of protection.

(a) Method I. Method I with a hard-drying, thin-film preservative P-1 or P-19 is widely used for preserving metal parts. In selecting the type of preservative, you must determine if the item can be used without preservative removal. If not, then a soft film preservative must be used. Method I must be of such a nature that depreservation by means of solvents, vapor degreasers, or alkali metal-cleaning compounds will not damage the item nor impair its operation. Figure 6-3 illustrates an item with method I preservation that can be used without depreservation.

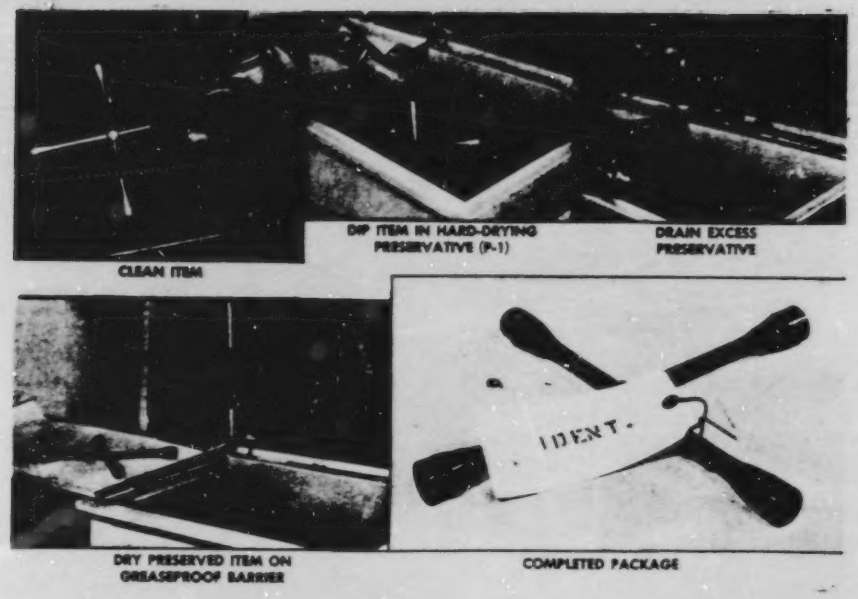


Fig 6-3. Application of method I using a hard-drying preservative.

(b) Method IA. This method is a water-vaporproof enclosure in which the items are placed for storage or shipment, with or without preservative coating. Originally intended to prevent corrosion on metal parts, it is used without a contact preservative to keep fabric, paper, plastic, and other nonmetallic items clean and dry during shipment and storage. The enclosure may be a rigid container, or a water-vaporproof barrier depending on submethod being used. There are seven applications of submethods of method IA and they are employed with or without contact preservatives as required except submethod IA-6 where a preservative is always used.

Submethod IA-5. Rigid metal container, sealed.

Submethod IA-6. Rigid container (items immersed in oil-type preservatives) sealed. This submethod always requires the use of preservatives (fig 6-4).

Submethod IA-8. Water-vaporproof bag, sealed.

Submethod IA-13. Rigid container, other than all metal, sealed.

Submethod IA-14. Container, bag, container.

Submethod IA-15. Container, bag.

Submethod IA-16. Floating bag, sealed.

Fig 6-4. Submethod IA-6 (items immersed in oil preservatives).

(c) Method IB. Strippable compound coated by dipping the item in a tank of melted plastic heated to specified temperatures. Coated items must be blocked, braced, or cushioned to insure that static load on the compound does not exceed 30 pounds per square inched (psi). In no case should the minimum thickness of the coating be less than 0.025 inch. This method can be accomplished by dipping the item in the compound or by wrapping the item and sealing the wrap by dipping.

(d) Method IC. Method IC consists of enclosing the item in a waterproof barrier. The type of waterproof barrier depends on the submethod to be used. Method IC protects the item from water but not from water vapor. There are seven applications of method IC used with or without a preservative:

IC-1. Greaseproof, waterproof bag, sealed.

IC-2. Container, bag, sealed.

IC-3. Waterproof bag sealed.

IC-4. Rigid container, other than all metal, sealed.

IC-7. Blister package, multiple-compartment, individually sealed.

IC-9. Skin package, waterproof; grease proof-vacuum formed.

IC-10. Skin package waterproof, vacuum-formed.

(e) Method II. Water-vaporproof barrier with desiccant (with contact preservative when required). Method II is used for items of highly critical nature which require the highest degree of protection from damage by water vapor, and mechanical or electrical items which cannot be treated with preservatives. Since corrosion of an item will not normally occur when a relative humidity of 30% is maintained, method II affords complete protection by keeping the humidity below this level, usually 20%. The effectiveness of method II preservation rests upon five factors:

(1) The volume of enclosed space.

(2) The surface area of the enclosing barrier.

(3) The water vapor transmission rate of the enclosing barrier.

(4) The moisture content of the item and dunnage at the time of preservation.

(5) The quantity of desiccant used.

There are six submethods of application of basic method II preservation. For a list of these submethods and their uses, refer to the current edition of MCO P4030.31.

(f) Method III. Method III provides mechanical and physical protection only and does not afford any protection against water, water vapor, fumes, or atmospheric gases. Mechanical and physical protection is provided by typing, wrapping, cushioning, blocking, bracing, palletizing, boxing, etc. Items packaged by method III are generally those of noncritical nature made of corrosion-resistant metals or inert nonmetals such as crockery, ceramics, or nonoptical glass.

6-4. PACKING PRINCIPLES AND STANDARD SHIPPING CONTAINERS

a. Levels of packing.

(1) Level A, military pack. The degree of packing which will afford adequate protection during shipment, handling, indeterminate storage, and worldwide distribution (fig 6-5).

(2) Level B, limited military pack. The degree of packing which will provide adequate protection against damage during multiple shipments in which shipping and handling will be under cover and storage in warehouses or other structures providing equivalent protection from the weather.

(3) Level C, minimum military pack. This level of packing will provide adequate protection against damage during direct domestic shipment from the supply source to the first receiving activity for immediate use. This level, as a minimum, must conform to applicable carrier rules and regulations and may be the supplier's commercial pack when such meets the requirement of this level.

(4) Industrial Packing. This level of packaging will be used whenever logistics conditions justify.

Fig 6-5. Levels of packing.

b. Types of loads. The term "type of load" refers to the physical characteristics of the item as it contributes to the support of, or damage to the container. There are three types of loads: type 1, type 2, and type 3 (fig 6-6).

(1) Type 1 (easy load). This type of load consists of a single item or single interior container which provides complete and uniform support to all faces of the shipping container. The contents are of moderate density and are relatively sturdy. Examples are: wood or metal chest, toolkits, and canned or boxed items packed in a fiberboard box that completely fills the outer shipping container.

(2) Type 2 (average load). This type of load is composed of more than one item or interior container which gives some support to all faces of the shipping container. The contents are of moderate density and relatively sturdy. Some examples are: goods in metal cans which are not packed in an interior container, bottles individually cushioned, hardware in cartons, etc.

(3) Type 3 (difficult load). This type of load gives little or no support to the shipping container. The contents can be extremely heavy, very fragile, irregular in shape, bulk materials which are free to shift and flow, or a combination of several of these factors. Some examples are: rivets, bolts, and nuts, delicate instruments, machined parts, and assemblies.

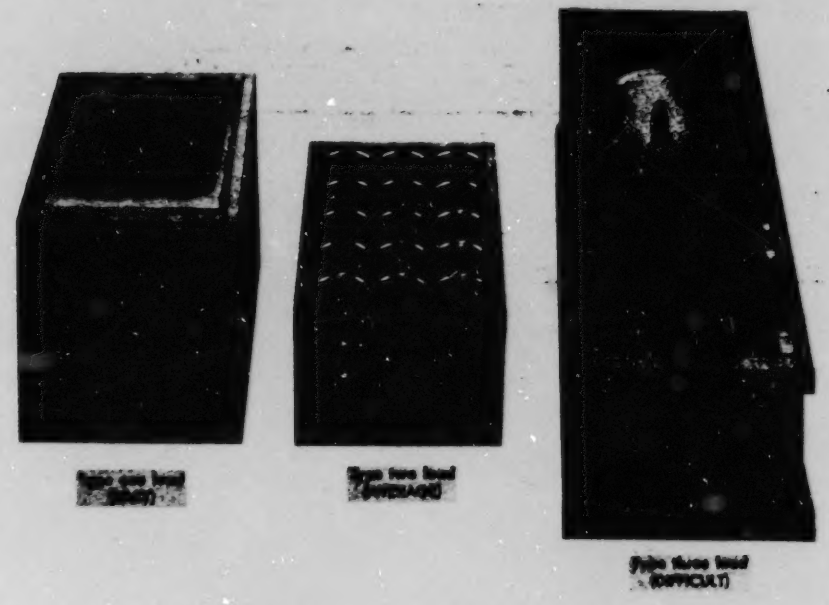


Fig 6-6. Types of loads.

c. Sequence of packing operations. Since packaging alone cannot provide all the protection needed for the shipment and storage of military items, it must be supplemented by adequate packing. Packing is defined as "the application or use of exterior shipping containers and assemblies of items or packages therein together with any necessary blocking, bracing, cushioning, weatherproofing, exterior strapping, and marking of the shipping container." Military packing is accomplished through the use of some or all of the following steps (fig 6-7.).

(1) Selection and use of exterior shipping containers.

(2) Assembling of items or packages into the container.

(3) Blocking, bracing, or cushioning the items or packages within the container.

(4) Weatherproofing the contents.

(5) Strapping the container.

(6) Marking the container for content identification.

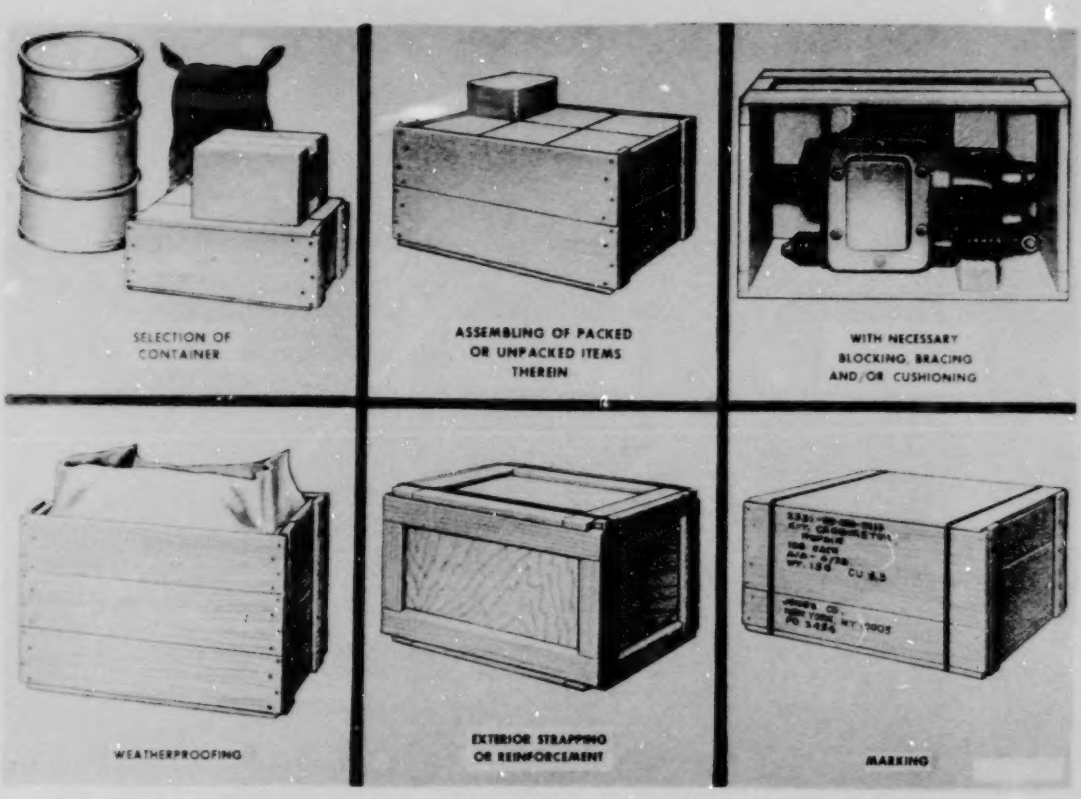


Fig 6-7. Operations involved in packing.

d. Selection of containers. In selecting an exterior container, you must relate the type of load to the container. Several factors must be considered, the characteristics of the item to be packed and weight of the article. Weight is one of the most important factors. When the choice falls between the use of two or more different containers, each offering the same degree of protection, you should choose the container that will keep tare weight and cube to a minimum. Tare weight is the weight of the container only; cube refers to the amount of space occupied by the container. Table 6- gives a partial listing of the containers suitable for level A, B and C shipments.

Table 6-2. Containers for Level A and B shipments

Specification Number Current edition	Description
PPP-B-585	Box, Wood, Wirebound
PPP-B-591	Box, Fiberboard, Wood-Cleated
PPP-B-601	Box, Wood, Cleated Plywood
PPP-B-621	Box, Wood, Nailed and Lock Corner
PPP-B-636	Box, Fiberboard
PPP-B-640	Box, Fiberboard, Corrugated, Triple Wall
MIL-C-52950	Crate, Wood, Open and Covered
PPP-D-705	Drums, Metal Shipping, Steel (over 12 and under 55 gallons)
MIL-C-104	Crate, Wood, Lumber and Plywood Sheathed, Nailed and Bolted
MIL-C-3774	Crate, Wood, Open 12,000 and 16,000
MIL-D-6054	Drum, Metal-Shipping and Storage
MIL-B-17757	Box, Fiber, Corrugated (Modular Size)
MIL-C-22806	Crate, Sheathed, Wood, Wirebound
MIL-B-26195	Box, Wood-cleated, Skidded, Load-bearing Base
MIL-B-400030	Drum, Plastic molded polyethelene

(1) Nailed wooden boxes. As an exterior shipping container, the nailed wood box is the most frequently used small shipping container. Additional information on materials and construction requirements, styles, and intended use of nailed wood boxes can be found in section III of MCO P4030.21_ and PPP-B-621_.

(2) Sheathed and unsheathed crates. A crate is a container formed of frame members which protect and sustain the contents against damage due to hazards encountered in transportation, handling, and storage. Crates must be capable of withstanding extreme shipping handling and storage conditions (fig 6-8).

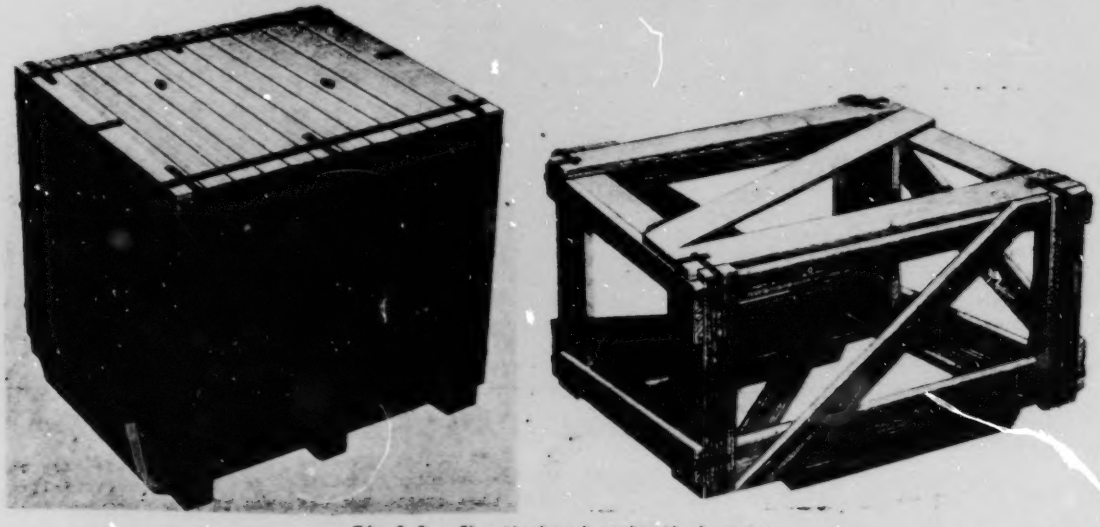


Fig 6-8. Sheathed and unsheathed crates.

(3) Fiberboard boxes. Fiberboard boxes are the lightest and least expensive. There are several limitations to consider when you use fiberboard containers. The maximum weight of a fiberboard box and its contents is 160 pounds for domestic shipment and 110 pounds for overseas shipment. Type 1 and 2 loads are the only ones permitted to be packed in this container. Fiberboard boxes are made of V-board which is a heavy-duty highly weather resistant board, or W-board which is a lower strength, highly weather resistant board. These containers may be used as interior or exterior containers but the primary use of boxes made of V-board is for overseas shipment and those made of W-board for domestic shipment.

(4) Wirebound wood boxes. A wirebound wood box consists of face boards that form the sides, top, and bottom with two or more binding wires stapled to the boards to form a mat or blank. These boxes are used for export shipment of materials weighing not more than 400 pounds. When properly designed, these boxes may carry either type 1, type 2, or type 3 loads. For type 1 and 2 loads, the contents must fit snugly into the boxes and give support to all faces of the container. Additional information on wirebound wood boxes can be found in section III of MCO P4030.21_.

(5) Cleated panel boxes. Cleated boxes are made by attaching wood cleats to sheets of plywood, fiberboard, or other similar material to form panels that are later fastened together at the cleats to form a container. This container has complete coverage of all faces. It has good water and moisture resistance when the panel material is of water-resistant type. When plywood is used, these containers have a high resistance to mashing at the corners and will withstand severe dropping. Cleated panel boxes consist of 11 styles, A through K. Styles A and B are designed for both overseas and domestic shipments and styles C through K are for domestic use only. Fiberboard cleated panel boxes are limited to type 1 and 2 loads and to weights of 400 pounds for domestic shipment and 200 pounds for overseas shipments. Plywood cleated panel boxes can carry the three types of loads and up to 1,000 pounds for both domestic and overseas shipments (fig 6-9).

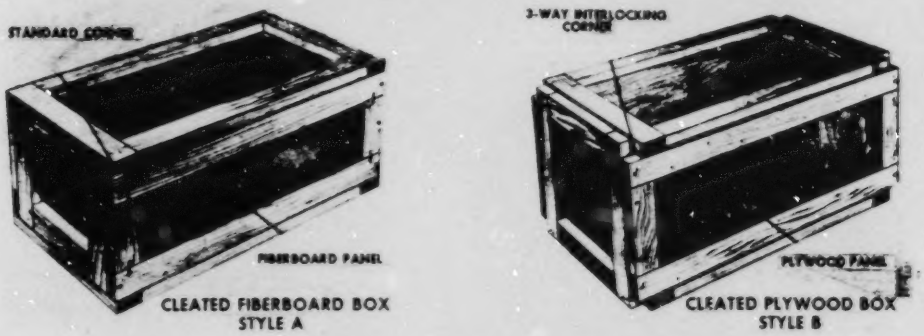


Fig 6-9. Overseas style of cleated panel boxes.

(6) Triple-wall corrugated fiberboard boxes. A triple-wall corrugated fiberboard box is a container made of triple-wall corrugated fiberboard and it consists of three sheets laminated to four flat facings resulting in a relatively sturdy structural material. These boxes are suitable for difficult heavy loads that require exceptionally large containers resistant to sudden forces, are highly resistant to compression, and able to sustain heavy loads for long periods of time. They are light in weight and smaller in cube than wooden containers and have cushioning characteristics due to the corrugated stock from which they are built.

6-5. SPECIAL-PURPOSE CONTAINERS

a. Metal drums. All cylindrical metal containers of more than 10-gallon capacity are generally classified as drums. Drums are usually made of steel or alloy.

b. Shipping and storage metals drums (MIL-D-6054). These are reusable containers incorporating a fully removable cover with a bolted ring or twist-lock closure. Rolling hoops increase the strength and serve to anchor internal dunnage through the use of split steel locking rings which fit within the rolling hoops. These containers come in various sizes ranging from 3- to 80-gallon capacity. The inside diameter ranges from 10.50 to 30 inches and the inside height from 8.08 to 41.12 inches. These containers are suitable for the packing of delicate items which require a high degree of protection from physical, chemical, and mechanical damage.

c. Metal drums 55-gallon (PPP-D-729). These drums are intended for use in the shipment of noncorrosive materials.

d. Fiber drums. Fiber drums are cylindrical containers with bodies made of fiberboard. These drums are low in tare weight, dustproof, waterproof, and can be easily opened and closed. Fiber drums should be used in lieu of metal drums, whenever possible, to save initial costs. Unless otherwise specified, drums should be provided with a full open top (fig 6-10 and table 6-3).

Table 6-3. Fiber Drums (PPP-D-723)

Type	Grade	Class	Use
I (Domestic)	A		For solid or dry materials.
	B		For semiliquid materials.
	C		For hot-poured materials that solidify on cooling.
	D		For rolled or cylindrical items.
II (Normal overseas)	A		For solid or dry materials.
	B		For semiliquid materials.
	C		For hot-poured materials that solidify on cooling.
III (Military overseas)	A		For solid or dry materials.
	C	1—For contents having a minimum melting point of 120° F. 2—For contents having a minimum melting point of 160° F.	For hot-poured materials that solidify on cooling.
	D		For rolled or cylindrical items.

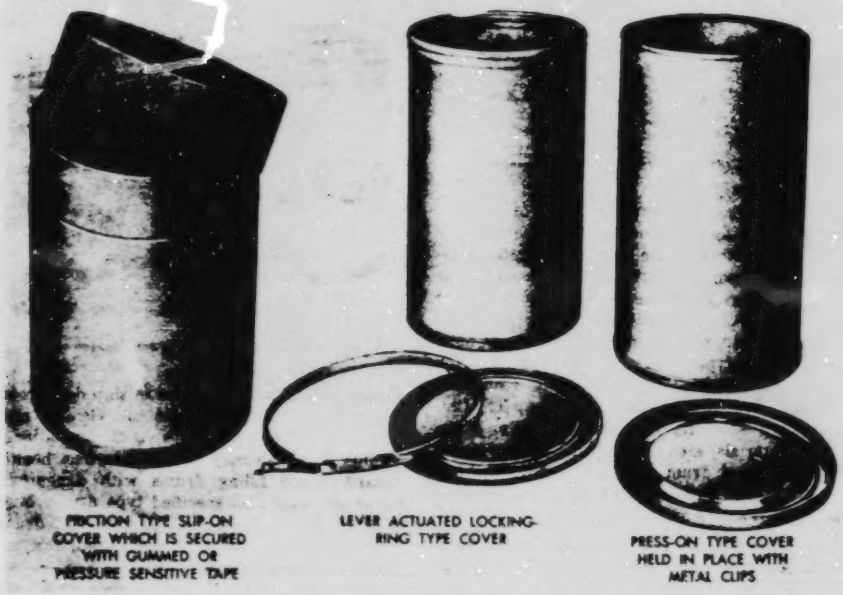

FRICTION TYPE SLIP-ON COVER WHICH IS SECURED WITH GUMMED OR PRESSURE SENSITIVE TAPE
LEVER ACTUATED LOCKING-RING TYPE COVER
PRESS-ON TYPE COVER HELD IN PLACE WITH METAL CLIPS

Fig 6-10. Typical closures of fiber drums.

e. Paper shipping sacks. Paper sacks are custom-made, flexible containers made from 3 to 6 plies or walls of specified papers. They have a low tare weight and offer an economical way of consolidating powdered and granular materials for shipment. Their single limitation is that the weight of contents must not exceed 110 pounds. When using these sacks, you should insure that the top and bottom of the sack are properly closed (fig 6-11).

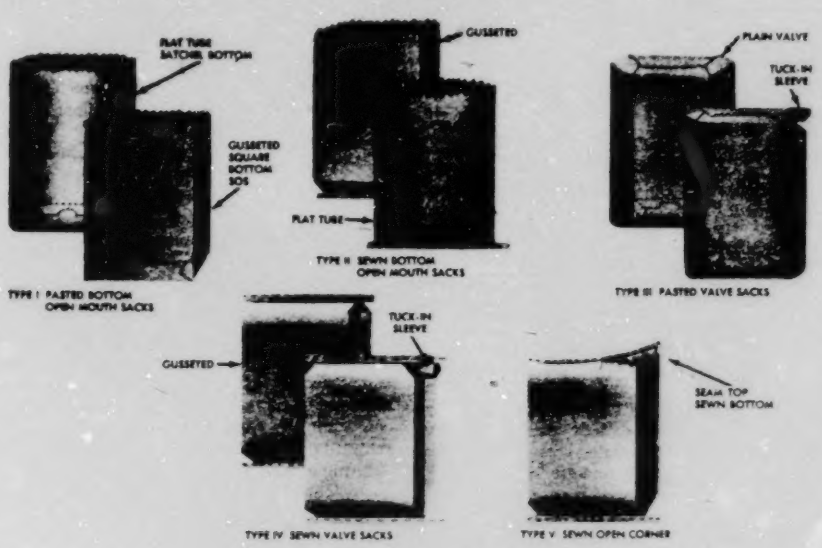


Fig 6-11. Types of paper shipping sacks.

f. Textile, burlap, cotton, and waterproof laminated bags. These bags are constructed from burlap cloth, textile laminated to paper, or other suitable material. The choice of proper type, class, grade, and style of bag depends on the requirements of the product to be packed, such as the moisture or water resistance, strength, sifting, etc. For specifications and uses of these bags, refer to MCO P4030.21_.

6-6. BRACING, BLOCKING, CUSHIONING, WEATHERPROOFING, AND STRAPPING

a. General. After the correct type of container has been selected, you must then determine the correct method of putting the items into the container to prevent damage from jolting and weather.

b. Blocking and bracing. Blocking and bracing provides physical and mechanical protection by means of firm rigid materials which prevent free movement of the item within the container. Figures 6-12 through 6-15 illustrate methods of bracing and blocking applied during packing.

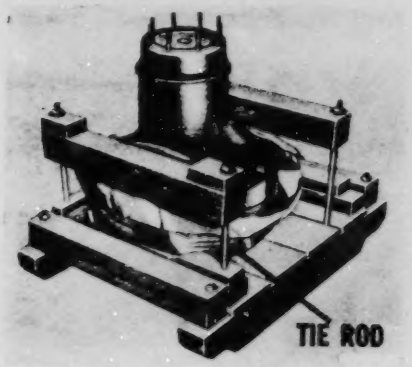


Fig 6-12. Vertical use of tie rods.

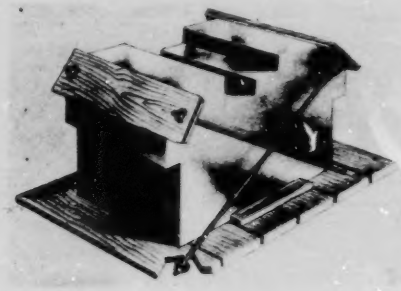


Fig 6-13. Diagonal use of tie rods.

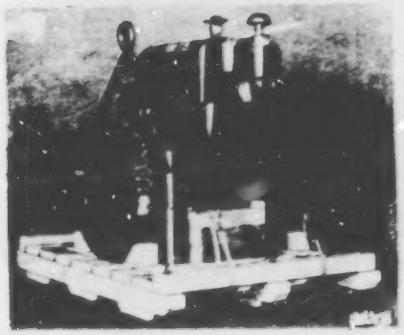


Fig 6-14. Blocking and bracing on item to a skid base.

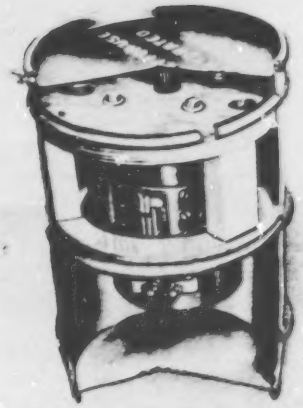


Fig 6-15. Blocking and bracing the interior of a drum with the use of internal locking rings.

c. Cushioning. Cushioning is the protection given an item against physical and mechanical damage by means of absorbing the energy of shocks and vibrations through a gradual but increasing resistance to the movement of the item. Figures 6-15 through 6-19 illustrate methods of cushioning.

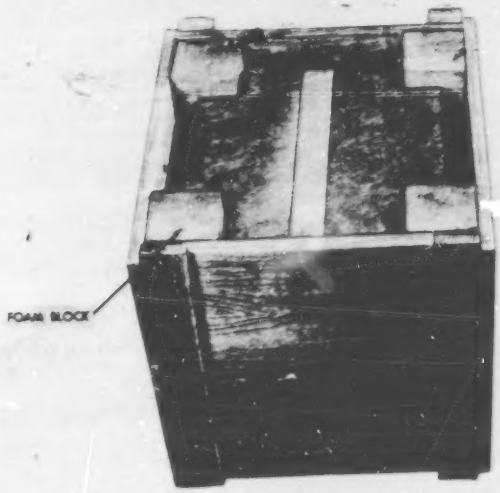


Fig 6-16. Cushion blocks between interior and exterior container.

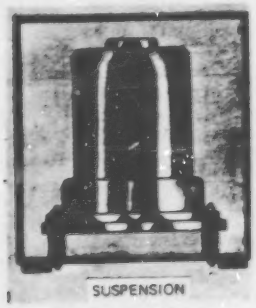


Fig 6-17. Suspension, item cushioned by mounting on springs.

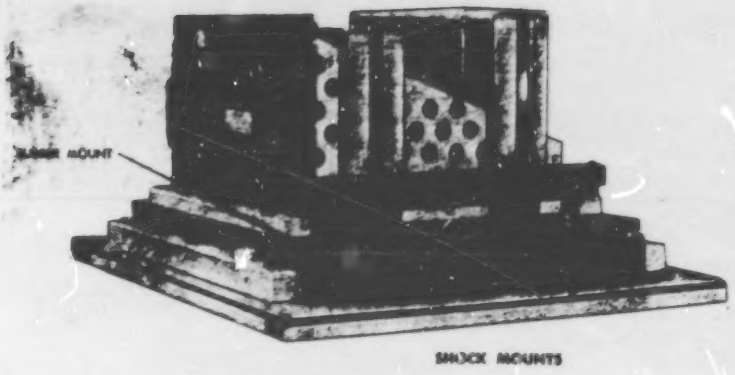


Fig 6-18. Item cushioned by shock mounts.

Fig 6-19. Flotation, item encompassed by cushioning material.

d. Weatherproofing. Water in its different forms is the main damaging factor in climatic exposures. Exposure hazards are controlled by preservation and packing and by using water-resistant exterior containers and waterproof barrier material. Figures 6-20 through 6-24 illustrate methods of waterproofing.

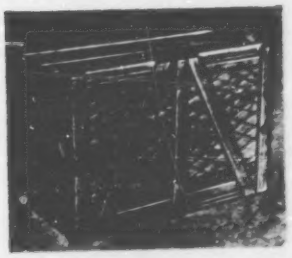


Fig 6-20. Interior shroud.

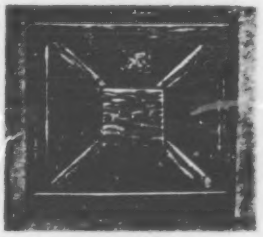


Fig 6-21. Crate liners.

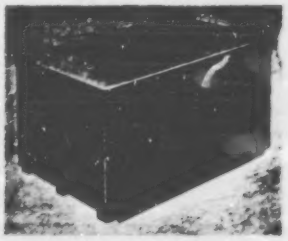


Fig 6-22. Crate top covers.

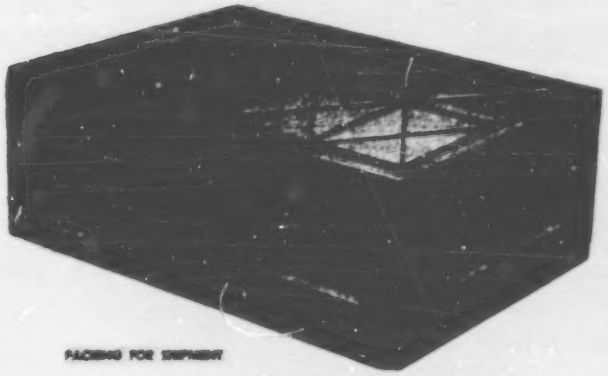


Fig 6-23. Individual packages waterproofed.

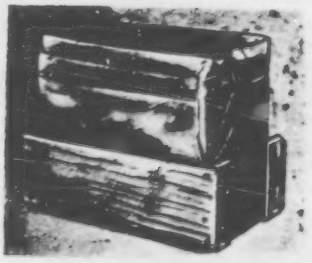


Fig 6-24. Case liner.

e. Strapping. Strapping is the process of reinforcing containers with steel straps, wire, metallic bands, or filament tape. The size and type of containers will determine the number and the placement of the strapping.

6-7. REUSABLE CONTAINERS

a. General. The materials saved from in-shipments can often be used for out-shipments. Care should be taken in the opening and removal of the contents of a package to preserve the packaging material as much as possible and to cause the least damage possible to the container. The following items should be saved if at all possible:

(1) Barrier materials.

(2) Cushioning materials.

(3) Cleated fiberboard and metal containers.

(4) Wooden containers.

(5) Wood blocking and bracing materials.

b. Conservation and maintenance of metal drums. You should do your utmost to conserve metal drums because of their high cost to the Government. When empty, returnable drums must be closed tightly and returned promptly. They should not be cleaned, rinsed, or contaminated by filling with any other material. Drums should be inspected as soon as returned, cleaned promptly, have necessary repairs made, repainted, and placed in dry storage with all openings tightly closed. Be careful when handling a returnable drum because the commodity shipped in it may have been poisonous liquid, acid, or other dangerous material. Exercise care in opening and closing these drums. Apply necessary ICC Empty Caution labels.

c. Wooden boxes and crates. If care is exercised in opening these containers, they can be reused and thereby save money for the Government. Engines, transmissions, transfer assemblies, and axle assemblies are packed in reusable containers, and these should be saved for reshipment. Care in opening and the use of proper tools in opening containers will aid in saving containers for out-shipment of similar items. Normally containers are marked to indicate "reusable" and "do not destroy"; however, it is up to the individual to determine if a box or container is reusable even though it is not so marked. Figure 6-25 illustrates types of reusable containers.

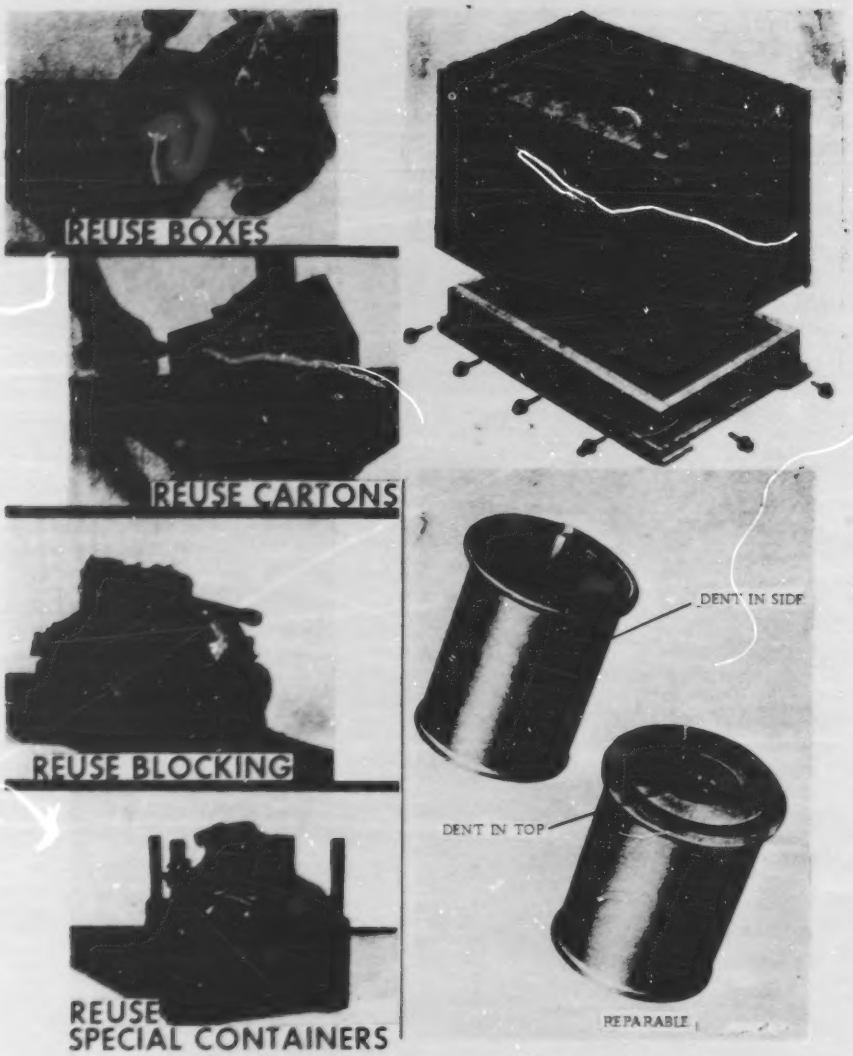


Fig 6-25. Types of reusable containers.

6-8. MARKING FOR STORAGE AND SHIPMENT

a. Marking materials. All marking materials used must either be as specified in MIL-STD-129 or be approved by proper authority. Marking materials may be divided into waterproofing materials, stenciling materials, obliterating materials, and tags or labels.

(1) Waterproofing materials.

(a) Spar varnish (TT-V-121). This varnish is used for waterproofing of exterior container markings and labels. It is suitable for use in both exposed and covered storage areas.

(b) Acrylic coating compound. This coating compound is clear and water-resistant. It serves the same purpose as spar varnish and also prevents corrosion on metal surfaces.

(c) Adhesive, cellulose nitrate base. This material is used to apply labels to containers and to waterproof them. The dual purpose of this material makes it economical and handy for use.

(d) Adhesive and protective coating material. This material is used not only as an adhesive but also to waterproof tags and markings.

(2) Stencil materials.

(a) Stencil inks (TT-I-558 , and TT-I-559). These inks are weather-resistant, fast-drying, and have a flat finish. They are made in black, white, red, yellow, green, blue, gray, and orange. For marking fiberboard or wood boxes, black is generally used. Separate inks are made for use on porous and nonporous surfaces.

(b) Stencil lacquer (TT-L-20). This material is weather-resistant and fast-drying. It is intended for use on primed metal surfaces, preferably zinc-chromate primed.

(c) Stencil enamel (TT-D489). A synthetic glass enamel that is weather-resistant and fast-drying. This enamel is suitable for use on exterior and interior wood and smooth metal surfaces that have been previously primed.

(d) Gasoline-soluble paint (MIL-P-13983). This paint is used when markings are applied directly to equipment such as vehicles. At destination, the markings can be removed with the use of gasoline.

(3) Obliterating materials (those that blot out, erase, or cover up). Quick-drying opaque paints and lacquers approximating the color of the container (when approved) may be used as obliterating materials. Lusterless lacquer conforming to specification TT-L-40 , and a stenciling and obliterating water emulsion paint conforming to specifications MIL-P-52108_, are examples of obliterating materials.

(4) Tags and labels.

(a) Tags (UU-T-81). Cloth or paper shipping tags must be either white or manila. Metal shipping tags must be corrosion-resistant. Tags should be attached to items with corrosion-resistant wire or twine as specified.

(b) Labels. Labels must be made of white paper and have a smooth finish. They are used on interior packages, paper-wrapped rolls, unpacked items and, under certain conditions, on shipping containers. Labels applied to level A packs must be waterproofed by coating the entire outer surface of the label with waterproof lacquer, varnish, clear acrylic coating compound, or label adhesive.

b. Marking requirements. According to the current edition of MIL-STD-129, marking must be done by the use of labels, stamping, stenciling, printing, or tagging. Except for piece number, total pieces, and weight and cube information, handlettering or writing cannot be used unless specifically authorized.

(1) Condition of surfaces to be marked. All surfaces must be clean and free of oil, grease, and any marks not applicable to the shipment. Advertising matter and ease markings are permitted. The required markings must be of a different color than the advertising matter when they cover part of the advertising.

(2) Legibility. Markings must be clear, legible, nonfading, and durable. The color of all markings must be black, except when applied to surfaces on which black is not legible.

c. Size of marking.

(1) Unless specified otherwise in MIL-STD-129, lettering for all markings must be in capital letters of equal height, and proportional to the available space of the container.

(2) Lettering for markings, other than the address, should not be less than 7/16 or more than 1 inch in height. The lettering may be reduced to 1/4 inch in height when necessary.

(3) Lettering for address markings and for labels or tags must be not less than 10 point type (1/8 inch). On metal tags the minimum size marking is 3/16 inch.

d. Identification. The following identification markings must be applied, as required, to all containers, palletized unit loads, and unpacked items. Refer to figures 6-26 through 6-28 for illustration of the markings described below.

(1) Stock number. This identification marking is required and should be the national stock number. When the NSN is not available, space should be left on the container for later placement of the same. In such cases, the manufacturer's part number is used and a space left immediately above such number for the NSN.

(2) Item description. Item description is the name and necessary adjectives of the item or part. It is required at all times.

(3) Quantity and unit of issue. The quantity is the number of items in a unit package, shipping container, bundle, or secured lift. The unit of issue is a standard or basic quantity in which an item of supply is divided, issued, or used. This is a required marking.

(4) Level of preservation and date. This required marking consists of the level of preservation and packaging, the level of packing, and the month and year of the earliest interior package.

(5) Gross weight and cube.

(a) Gross weight is the weight of the contents, dunnage, and container. This is expressed in pounds to the nearest pound.

(b) Cube is the volume of space occupied by the container. Cubic feet are shown decimally to the nearest 1/10 of a cubic foot.

(c) Gross weight and cube are required markings.

(6) Lot, batch, or control number. Used when specified or required.

(7) Outside dimensions. Outside dimensions must be shown on all containers having a single dimension of 72 inches or over. These dimensions are shown in order by length, width, and height, in inches to the nearest inch.

(8) Serial number. The serial number is the number appearing on the item as assigned by the manufacturer or Government for identification or control purposes.

(9) Special markings (when applicable). Special markings for the protection of item and shipping container or to identify sets or assemblies being shipped must be applied when necessary. Special warnings must also be shown, as required, regardless of the destination of the shipment.

(10) Address marking. Address markings must be applied to shipping containers by means of a Military Shipment Label (DD Form 1387) or a Military Shipping Tag (DD Form 1387-1). Exceptions to the use of these tags or labels are bundles of lumber, loose poles, and ties. Address markings for these items must be stenciled on the side directly below the identification markings.

(a) Overseas address. The overseas address should contain the following:

1. TCN (transportation control number).

2. RDD or expedited handling code (when applicable).

3. Project code when specified.

4. Consignor, shown coded and in-the-clear.

5. Transporation priority.

6. POE/APOE: Port of embarkation/aerial port of embarkation. Show coded and in-the-clear.

7. POD/APOD: Port of debarkation/aerial port of debarkation. Shown coded and in-the-clear.

8. Consignee, coded and in-the-clear.

9. Piece number (not required for shipments of a single commodity in standard pack containers or export shipments of wood products).

10. Total pieces (not required for export shipments of wood products).

11. Weight and cube (not required for export shipments of wood products).

(b) Domestic address. The domestic address should contain the following:

1. TCN (transportation control number).

2. RDD or expedited handling code (when applicable).

3. Project code, when specified.

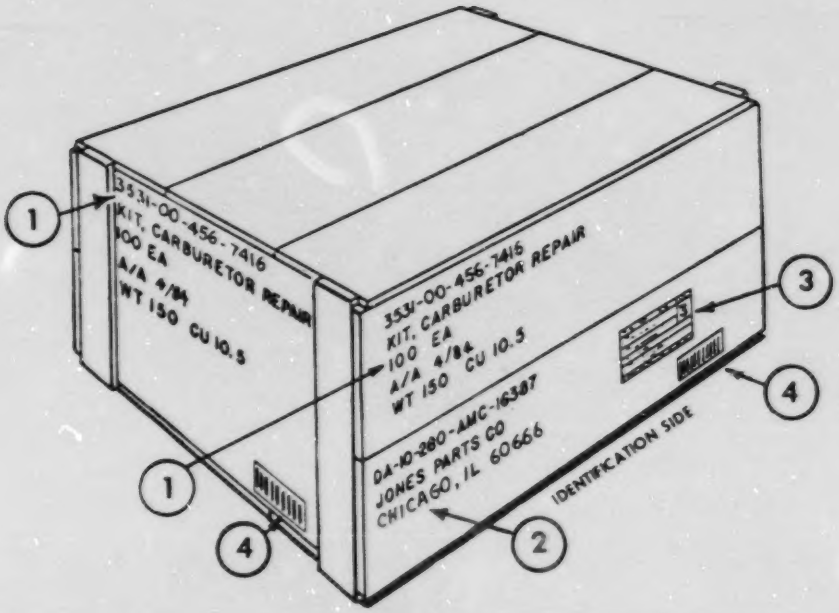
4. From: Name and address of consignor (coded and in-the-clear).

5. To: Name and address of consignee (coded and in-the-clear).

6. Piece number and total pieces (not required on full carload and truckload shipments of like items).

7. Weight and cube.

(11) Packing list. A packing list is used on containers packed with unlike items when a full description of the contents cannot be shown on the containers. One copy must be placed inside the container on top of the contents and the other in a waterproof envelope which is secured to the outside of the container in the most protected location. For overseas shipments, the outside copy is further protected with a packing-list protector which is secured over the packing-list envelope.



ITEM NO	REQUIRED MARKING
1	IDENTIFICATION MARKING
2	CONTRACT DATA MARKING
3	ADDRESS LABEL (DD Form 1387)
4	BAR CODE

JMPTC 1232L

Fig 6-25. Identification and contract markings.

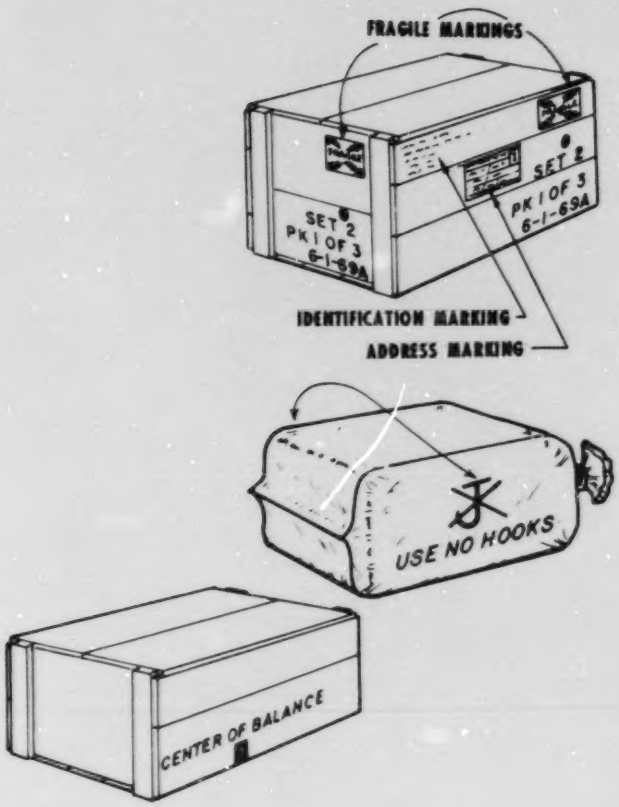


Fig 6-27. Handling marking.

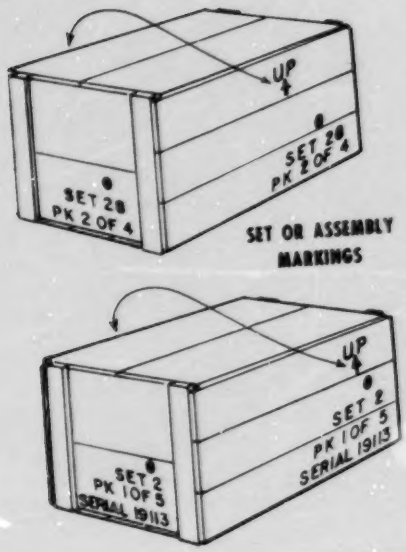


Fig 6-28. Set or assembly markings.

e. Special markings.

(1) Restrictive markings. Restrictive markings are for classified material, especially valuable items, and security items. These markings must be of such nature as NOT to reveal classification or permit ready identification of material.

(2) Set or assembly markings. When a set or assembly is placed in two or more containers, each container must bear, in addition to its own number, the total number of containers making up the set and the number of the set in each shipment. A 2-inch black-colored disc must be placed above the numbers on each container signifying that all containers in the set should be shipped together. When machines are disassembled for shipment and the component parts are packed in two or more containers, each container must bear the serial number of the machine in addition to the regular set marking.

(3) Fragile items. At least two surfaces of all rectangular containers or two equally spaced points on the circumference of cylindrical containers packed with delicate or fragile articles must be marked FRAGILE by the use of labels, stencils, or imprints as applicable.

(4) Arrows. When the safety of the contents necessitates that containers be stacked with the top surface up, two sides of rectangular containers and two equidistant points on the outside of cylindrical containers should be marked with the word UP and with an arrow toward the top of the containers. The length of the arrow cannot be less than 1 inch and the stem not less than 1/2 inch in width with the size proportioned to the available space on the container.

(5) Center of balance. A one-inch wide vertical line not less than three inches long locating the center of balance should be extended up from the bottom edge of both sides of containers over 10 feet in length or those which are unbalanced. This line must be identified by stenciling or printing in one-inch letters the words "CENTER OF BALANCE" immediately above or alongside the line.

(6) Boxes and packages containing magnets, magnetron magnets, or magnetron tubes suitable for air shipment. These boxes and packages must be conspicuously marked on two opposite sides with a red caution label with white lettering (fig 6-29).

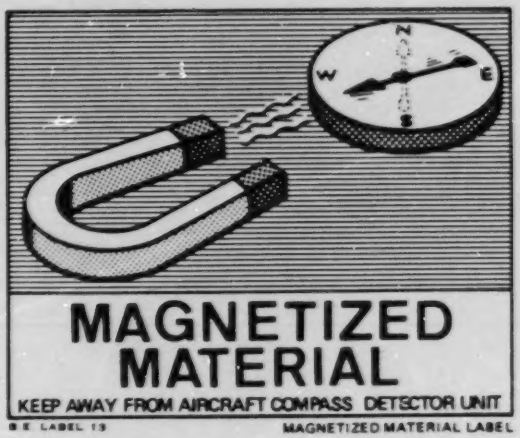


Fig 6-29. Caution label for magnetic equipment suitable for air shipment.

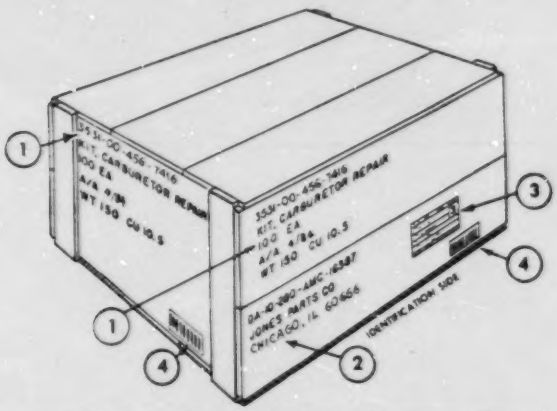
(7) Boxes containing magnets not suitable for air shipment. Boxes and packages containing magnets, magnetron magnets, or magnetron tubes not suitable for air shipment must be conspicuously marked on two opposite sides with a red CAUTION label with white lettering (fig 6-30).

Fig 6-30. Caution label for magnetic equipment not suitable for air shipment.

(8) Method II marking. Method II packages which are shipping containers must bear a precautionary label. When Labels are not available, a reproduction of the label may be printed or stenciled on the container with waterproof red ink. When there is not enough space for labeling, the words "Method II pack, DO NOT OPEN UNTIL READY FOR USE," must be printed or stenciled on the container in letters as large as space permits.

f. Location of markings.

(1) Boxes and crates. The top, bottom, and one end of boxes and crates must be free of markings except for special markings required for safe handling or by existing regulations (fig 6-31).



ITEM NO	REQUIRED MARKING
1	IDENTIFICATION MARKING
2	CONTRACT DATA MARKING
3	ADDRESS LABEL (DD Form 1387)
4	BAR CODE

Fig 6-31. Basic markings for boxes over 70 cubic feet.

(a) Identification markings. Stenciled or printed on one end and one side. End markings are placed in the upper two-thirds of the end. Side markings are placed on the side to the right of the marked end, on the left, upper two-thirds of the container. Containers of less than 10 cubic feet do not require the end to be marked (fig 6-31).

(b) Contract data markings. Contract data is stenciled or printed directly on the container or, when applied to fiberboard containers, may be shown on a printed, reproduced, or typed label. Markings are placed below the identification marking on the side of the ccntainer. Contract data may be omitted from shipments overseas whenever such data interferes with the placement of handclasp emblems or other required markings (fig 6-31, C).

(c) Address label or tag. For transportation priority 1 a red-bordered label or tag is used, for transportation priority 2 it is blue-bordered, and for transportation priority 3 the plain label or tag is used. The label is applied on the identification marked side.

(2) Barrels and drums. The identification markings on barrels and drums must be shown in the upper third of one side and on the top. On the same side, the address label must be placed in the middle third. On the upper third of the opposite side, place the contract data.

(3) Rods, shafting, bars, etc. Fabricated rods, shafting, bars, etc., which are shipped without packing must be marked with two tags securely attached to the article, one of which is concealed by being bound to the article with burlap or other covering and each end of the covering securely fastened (fig 6-32).

(4) Reels of spools of cable and wire (except barbed wire). Reels or spools of cable and wire must be stenciled as specified for the sides of boxes or tagged in such a manner as to prevent the possibility of the marking becoming illegible during use of the reel or spool, regardless of whether or not the spools or reels are enclosed within a shipping container.

(5) Coils of wire. Identification and contract data markings are applied on two tags securely attached to the coil (fig 6-32).

(6) Paper-wrapped rolls. Rolls wrapped with paper are marked on one side (approximately 1/4 of circumference) by stenciling or printing or by a typed label which contains the identification and contract data. This combined marking must not occupy more than one-third of the side of the roll. One end is marked with a typed label. This label should contain only the national stock number and quantity. DD Form 1387 or DD Form 1387-1 is used for address markings (fig 6-32).

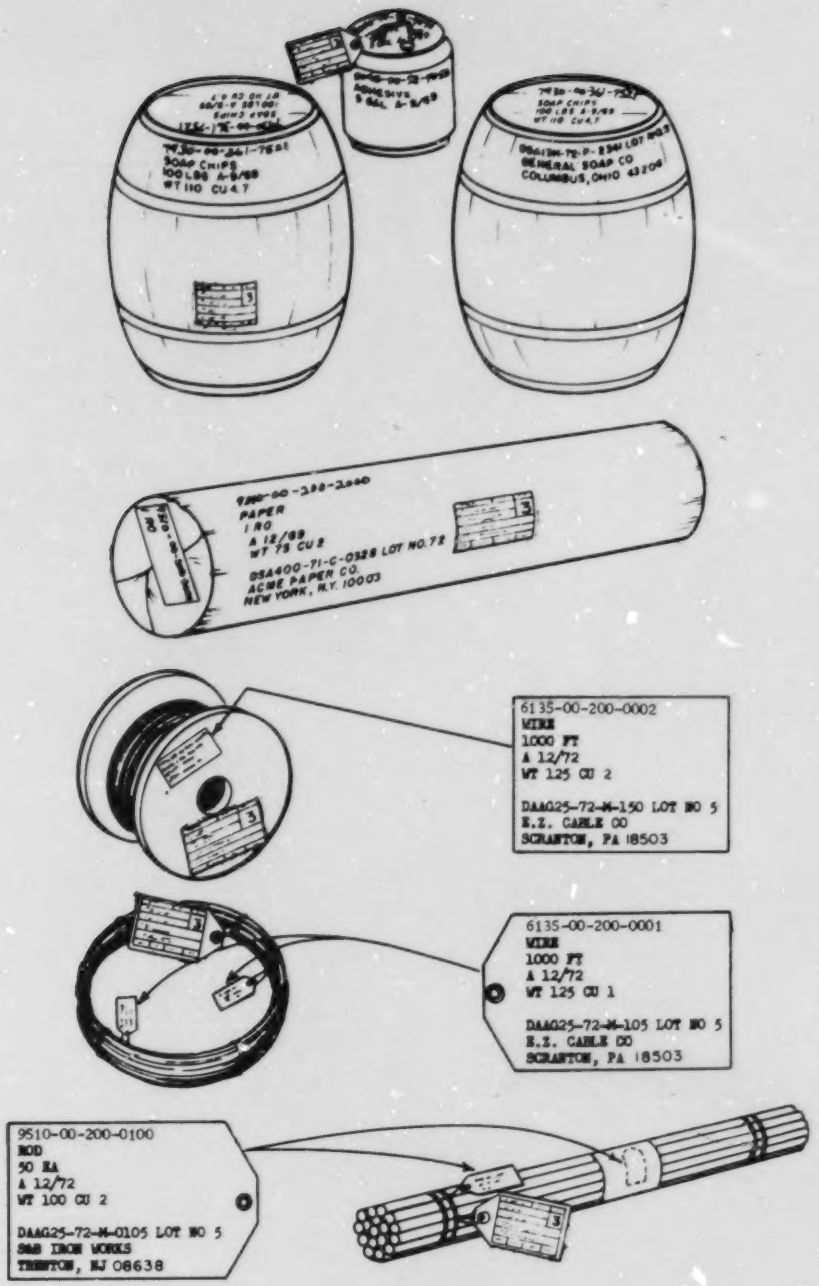


Fig 6-32. Basic markings for miscellaneous packs.

6-9. COURSE CONCLUSION

Now that you have completed the lessons for this course, it is time to prepare for the final examination. Your best preparation will be to review the lessons until you can answer all of the questions correctly without reference to the text. When you can do this, you may be sure you will have no trouble with the final examination. If you have the time available to you, a second reading of the chapters of the text will be helpful. Good luck on your final examination.

WAREHOUSING OPERATIONS

Lesson 6

Preservation, Packaging, and Packing

STUDY ASSIGNMENT: MCI 30.3h, Warehousing Operations, chap 6.

LESSON OBJECTIVE: Upon successful completion of this lesson, you will able to identify the procedures used in required methods of preservation, packaging, and packing and determine the correct placement and methods for marking of military supplies for storage and shipment.

WRITTEN ASSIGNMENT:

A. Multiple Choice: Select the ONE answer which BEST completes the statement or answers the question. After the corresponding number on the answer sheet, blacken the appropriate circle.

Value: 1 point each

1. Which situation requires level "C" protection?

   a. Favorable warehouse conditions for temporary periods
   b. Multiple rough handling during transportation
   c. Special package features for combat operations
   d. Multiple rough handling during in-transit storage

2. What level of preservation and packaging is applied to items for whose final destination, handling, and/or storage conditions are unknown?

   a. A
   b. B
   c. C

3. Material to be stored for extended periods of time under favorable warehouse conditions is packed to what level of protection?

   a. A
   b. B
   c. C

4. What is the first essential operation in an effective packaging cycle?

   a. Drying
   b. Cleaning
   c. Identification
   d. Wrapping

5. Which cleaning solution is used for the removal of fingerprints?

   a. Steam vapor
   b. Gasoline
   c. Fingerprint remover
   d. Vapor emulsion

6. When an alkaline method is used for cleaning of material, the temperature of the clean rinse water should be at least

   a. 110° F.
   b. 150° F.
   c. 180° F.
   d. 212° F.

7. Which cleaning process requires the cleaning solvent to be at room temperature?

a. Vapor
b. Emulsion
c. Alkaline
d. Electrocleaning

8. Which submethod of protection always requires the use of preservatives?

a. IA-5
b. IA-6
c. IA-8
d. IA-13

9. Submethod IA-6 requires items to be immersed in oil and packed in a

a. sealed waterproof bag.
b. container, bag, container.
c. sealed rigid container.
d. floating barrier.

10. Which submethod requires items to be packed in a sealed water-vaporproof bag?

a. IA-5
b. IA-8
c. IA-14
d. IA-16

11. Which method of protection requires the use of strippable plastic compound?

a. I
b. IA
c. IB
d. IC

12. Which method of protection provides ONLY physical and mechanical protection?

a. IB
b. IC
c. II
d. III

13. Which criteria requires level "B" protection of supplies during handling, shipment, and storage?

a. Favorable warehouse conditions for extended periods
b. Controlled warehouse conditions for temporary periods
c. Limited handling during transportation and in-transit storage
d. Handling and storage conditions unknown

14. In which situation will level C packing provide adequate protection for shipment of supplies?

a. Direct domestic shipment to the first receiving activity for immediate use
b. Direct domestic shipment for long-term open storage
c. Indeterminate handling, storage, and worldwide distribution
d. Overseas shipments for storage in covered warehouse areas

15. Which type load provides complete support to all faces of the shipping container?

a. Type 1 (easy load)
b. Type 2 (average load)
c. Type 3 (difficult load)

16. Which items constitute a type 3 (difficult) load?

a. Metal cans
b. Machined parts
c. Toolkits
d. Metal chests

17. Which is NOT a packing operation?

a. Blocking and bracing
b. Strapping
c. Weatherproofing
d. Wrapping

18. You are faced with the choice of two containers, each of which gives the same protection to an item. You should choose the one that

a. has the lowest original cost.
b. stacks and handles the easiest.
c. will keep tare weight and cube to a minimum.
d. is more adaptable to the unit load.

19. The maximum weight of a fiberboard box and its contents for domestic shipment is _____ pounds.

a. 110
b. 125
c. 140
d. 160

20. Which box container is unsuitable for shipment of type 3 loads?

a. Wirebound wood
b. Plywood panel cleated
c. Fiberboard
d. Nailed wood

21. For export shipments, the maximum load weight in pounds for wirebound wood boxes is

a. 100.
b. 200.
c. 300.
d. 400.

22. Which styles of cleated panel boxes are used for overseas shipments?

a. A and B
b. A through D
c. B through K
d. C through K

23. What is the maximum weight of contents for paper shipping sacks?

a. 10 lb
b. 25 lb
c. 60 lb
d. 110 lb

24. Which container should be conserved and reused whenever possible due to its high initial cost?

a. Metal drums
b. Crates
c. Wooden boxes
d. Fiber drums

25. Which operation provides physical and mechanical protection?

a. Weatherproofing
b. Cleaning
c. Blocking and bracing
d. Strapping

26. Which packing operation provides mechanical protection to an item by absorbing the energy of shocks and vibration?

a. Blocking
b. Bracing
c. Strapping
d. Cushioning

27. What is the prescribed color for cloth or paper shipping tags?

a. White or manilla
b. Red
c. Blue
d. Orange

28. Lettering for markings of addreses on containers must not be less than ___ in height.

a. 3 in
b. 2 in
c. 1/8 in
d. 1/4 in

29. What is the minimum height for letter markings on metal tags?

a. 3/16 in
b. 1/4 in
c. 7/16 in
d. 1 in

30. What markings may be applied to a package by hand lettering?

a. Identification
b. Stock number
c. Contract
d. Weight and cube

31. A 2-inch black-colored disc above the shipping package number on a group of containers indicates

a. all the containers must be shipped together.
b. the items should be shipped as soon as possible.
c. the containers are fragile.
d. the containers must be shipped by air.

32. When a container holds fragile articles, how many surfaces of the container should be marked FRAGILE?

a. 1
b. 2
c. 3
d. 4

33. When arrows on a container are used to indicate "up," what is the mirimum length of the arrow?

a. 1 in
b. 4 in
c. 5 in
d. 6 in

34. Which marking is a 1-inch wide vertical line placed at the bottom edge of both sides of a container?

a. Set or assembly marking
b. Center of balance
c. Fragile item
d. Contract number

35. What color markings are used to indicate that a container holds magnets?

a. Black and white
b. Blue and orange
c. Red and white
d. Red and black

36. What is the proper place for identification markings on the end of a container?

a. Lower one-third of the end
b. Center of the end
c. Upper two-thirds of the end
d. Lower half of the end

37. Which marking is placed below the identification marking on the side of the container?

a. Contract data
b. Special markings
c. Domestic address
d. Shipping piece number

38. Where is the address label placed on the shipping container?

a. On the identification marked side
b. On the side above the identification markings
c. On the side above the contract data
d. On the end with the special markings

39. Where should the serial number be placed on shipping containers?

a. Lower right-hand corner of the container end and marked side
b. Lower left-hand corner of the container end and marked side
c. Directly on the container side in the upper two-thirds
d. Center of each end of the container

40. When using a label to mark the end of paper-wrapped rolls, what information should you enter on the label?

a. National stock number and quantity
b. Address markings
c. Quantity and price
d. Contract data

41. Which marking is placed in the middle third of the side of a drum?

a. Identification marking
b. Address
c. Contract data
d. Weight and cube

Note: Questions 42 to 46 require you to match the appropriate method of protection (a-e below) to its appropriate use.

a. Method IA
b. Method IB
c. Method IC
d. Method II
e. Method III

42. Maintain humidity below 30%.

43. Provide physical and mechanical protection only.

44. Protection from water but not from water vapor.

45. Protection for electrical items which cannot be treated with preservatives.

46. Protection from damage by water vapor.

Note: Questions 47 to 50 require you to identify the appropriate container (a-d below) to its appropriate use.

a. Plywood cleated panel box
b. Paper shipping sacks
c. Fiber drums
d. Fiberboard boxes

47. Normal overseas shipment of semiliquid materials.

48. Normal overseas shipment of hot-poured materials that solidify on cooling.

49. For shipment of type 1, type 2, and type 3 loads.

50. Used only for type 1 and type 2 loads.

Total Points: 50

* * *

APPENDIX I

CONDITION CODES (MATERIEL)

Notes: To be used only with DOD excess advice card, DOD excess advice deletion card, DOD excess advice revision card, and DOD excess status card.

Code	Expanded definition
N-1	New or unused property in excellent condition. Ready for use and identical or interchangeable with new items delivered by a manufacturer or normal source of supply.
N-2	New or unused property in good condition. Does not quite qualify for N-1 because slightly shopworn, soiled, or similar, but condition does not impair utility.
N-3	New or unused property in fair condition. Soiled, shopworn, rusted, deteriorated, or damaged to the extent that utility is slightly impaired.
N-4	New or unused property so badly broken, soiled, rusted, mildewed, deteriorated, damaged or broken that its condition is poor and its utility seriously impaired.
E-1	Used property but repaired or renovated and in excellent condition.
E-2	Used property which has been repaired or renovated and, while still in good usable condition, has become worn from further use and cannot qualify for excellent condition.
E-3	Used property which has been repaired or renovated but has deteriorated since reconditioning and is only in fair condition. Further repairs or renovations required or expected to be needed in near future.
E-4	Used property which has been repaired or renovated and is in poor condition from serious deterioration such as from major wear and tear, corrosion, exposure to weather or mildew.
O-1	Property which has been slightly or moderately used. No repairs required, and still in excellent condition.
O-2	Used property, more worn than C-1 but still in good condition with considerable use left before any important repairs would be required.
O-3	Used property which is still in fair condition and usable without repair, however somewhat deteriorated, with some parts, or portion worn, and should be replaced.
O-4	Used property, which is still usable without repairs but in poor condition and undependable or uneconomical in use. Parts badly worn and deteriorated.
R-1	Used property, still in excellent condition, but minor repairs required--estimated repairs would cost no more than 10% of acquisition cost.
R-2	Used property in good condition but considerable repairs required. Estimated cost of repairs would be from 11% to 25% of acquisition cost.
R-3	Used property, in fair condition but extensive repairs required. Estimated repair costs would be from 26% to 40% of acquisition cost.
R-4	Used property, in poor condition, and requiring major repairs. Badly worn and would still be in doubtful condition of dependability and uneconomical in use if repaired. Estimated repair costs would be from 26% to 40% of acquisition cost.
S	Scrap. Material that has no value except for its basic material content.
X	Salvage. Personal property that has some value in excess of its basic material content but which is in such condition that it has no reasonable prospect of use for any purpose as a unit, either by the holding or any other Federal agency, and its repair or rehabilitation for use as a unit, either by the holding or any other Federal agency, is clearly impractical. Repairs or rehabilitation estimated to cost in excess of 65% of acqusition cost would be considered clearly impractical for purposes of this definition.

APPENDIX II

CONDITION CODES (MILSTRIP)

PURPOSE: To classify materiel in terms of readiness for issue and use or to identify action underway to change the status of materiel.

CHARACTER: One digit, alpha.

COLUMN POSITION: CC 71.

Code	Explanantion
A	Serviceable-issuable without qualification. New, used, repaired, or reconditioned materiel which is serviceable and issuable to all customers without limitation or restriction.
B	Serviceable-issuable with qualification. New, used, repaired or reconditioned materiel which is serviceable and issuable for its intended purpose but which is restricted from issue to specific units, activities, or geographical areas by reason of its limited usefulness or short service-life expectancy.
C	Serviceable-priority issue. Items which are serviceable and issuable to selected customers, but which must be issued before condition A and B materiel to avoid loss as a usable asset.
D	Serviceable-test/modification. Serviceable materiel which requires test, alteration, modification, conversion or disassembly. This does not include items which must be inspected or tested immediately prior to issue.
E	Unserviceable-limited restoration. Materiel involves only limited expense or effort to restore to serviceable condition and which is accomplished in the storage activity where the stock is located.
F	Unserviceable-reparable. Economically reparable materiel which requires repair, overhaul, or reconditioning. Includes reparable items which are radioactively contaminated.
G	Unserviceable-incomplete. Materiel requiring additional parts or components to complete the end item prior to issue.
H	Unserviceable-condemned. Materiel which has been determined to be unserviceable and is uneconomical to repair--includes condemned items which are radioactively contaminated.
J	Suspended-in stock. Materiel in stock which has been suspended from issue pending condition classification or analysis, where the true condition is not known.
K	Suspended-returns from customer awaiting classification.
L	Suspended-litigation.
M	Suspended-in work.
N	Suspended-ammunition suitable for emergency combat use only. Ammunition stocks suspended from issue except for emergency combat use.
O-V	NOT assigned. Reserved for future assignment by DOD.
W	*Reparable-repair cost 11% to 25% standard unit price.
Y	*Reparable-repair cost 26% to 40% standard unit price.
Z	*Reparable - repair cost 41% to 65% standard unit price.
2	Reparable-cost of repairs above 65% of unit price. Total of repairs indicated in remarks field. Ref. MCO P4400.82 .

*THESE CODES ARE FOR INTRA-MARINE CORPS USE ONLY.

APPENDIX III

SPECIAL-HANDLING CODES

PURPOSE: To indicate that external control is required prior to issue.

APPLICATION: Provisioning division shall designate the new item to be assigned a special-handling code. Technical support division shall assign a special-handling code to established items. They are loaded in the master inventory file item header record.

CHARACTERS: One digit, alpha/numeric.

Code	Explanation
1	Technical check required prior to issue of item with serial/USMC number. (Put Status Code MA in initial status.)
2	Preservation and packing time required prior to issue of item with serial/USMC number. (Put Status Code MA in initial status.)
3	Codes 1 and 2, preceding.
4	Hazardous item with serial/USMC number requiring technical check prior to issue.
5	Hazardous item with serial/USMC number requiring packing and preservation prior to issue.
6	Hazardous item with serial/USMC number requiring both codes 1 and 2, preceding.
7-9	(Reserved.)
A	Technical check required prior to issue of item without serial/USMC number.
B	Preservation and packing time required prior to issue of item without serial/USMC number.
C	Codes A and B, preceding.
D	Hazardous item without serial/USMC number requiring technical check prior to issue.
E	Hazardous item without serial/USMC number requiring packing and preservation prior to issue.
F	Hazardous item without serial/USMC number requiring both codes A and B, preceding.
G-Z	(Reserved.)

APPENDIX IV

SHELF-LIFE CODES

PURPOSE: To indicate the time element before deterioration starts to become a factor.

CHARACTER: One digit, alpha/numeric

Code Type I	Code Type II	Shelf-Life Period
0	0	Nondeteriorative
A		1 month
B		2 months
C	1	3 months
D		4 months
E		5 months
F	2	6 months
G	3	9 months
H	4	12 months
J		15 months
K	5	18 months
L		21 months
M	6	24 months
N		27 months
P		30 months
Q	7	36 months
R	8	48 months
S	9	60 months

Table for Application of Condition Codes to Shelf Life

Shelf Life Condition Code	Explanation
A	Shelf life remaining is more than 6 months
B	Shelf life remaining is from 3 to 6 months
C	Shelf life remaining is less than 3 months

Table for Application of Condition Codes to Potency Dated Medical Materiel

Condition Code	Item Potency Period	Unexpired Potency Period --Months remaining--
A	18 months or more	over 9 months
A	12 to 17 months	over 7 months
A	6 to 11 months	over 3 months
	18 months or more	3 to 9 months
B	12 to 17 months	3 to 7 months
B	6 to 11 months	2 to 3 months
C	18 months or more	under 3 months
C	12 to 17 months	under 3 months
C	6 to 11 months	under 2 months

Note: Shelf-Life Codes, upon assignment in the master inventory file, are converted from the above codes to appropriate three digit numerical representation of number of shelf-life months as follows:

Code	Shelf-Life months
000	Nondeteriorative
001-120	1 month thru 120 months

Note: All users of Federal supply catalogs should report any differences on items coded to the item manager for review.

APPENDIX V

CYCLIC SHIPPING DAY CODES

PURPOSE: This is a local code used as an aid in scheduling shipments to certain geographical areas.

APPLICATION: Utilized in the MOWASP subsystem and maintained in the AC address file.

CHARACTERS: One digit, alpha.

Code	Explanation
A	Ship on Monday.
B	Ship on Tuesday.
C	Ship on Wednesday.
D	Ship on Thursday.
E	Ship on Friday.
F	Ship on Monday, Wednesday, or Friday.
G	Ship on Tuesday or Thursday.
H	Ship every day.

APPENDIX VI

ERROR CODES

PURPOSE: Primary error codes indicate the type of review action conducted which disclosed the error. Secondary error codes indicate the factors that actually caused the error.

APPLICATION: Generated by MOWASP for management which will analyze and evaluate the information contained in error listings for subsequent corrective action.

CHARACTERS: Two digits, alpha/numeric

PRIMARY ERROR CODES

CODE	EXPLANATION
A	Warehouse refusal that results in complete stock denial.
B	Indicates error discovered as a result of a statistical sampling.
C	Indicates error discovered as a result of wall-to-wall location verification.
D	Indicates error discovered as a result of a special inventory that was directed by the DMM or other authority.
E	Warehouse refusal that results in complete found issue.
F	Indicates late receipt report error.
G	Warehouse refusal that results in partial stock denial.
H	Warehouse refusal of bin replenishment notice -ZBI-.
I	Warehouse refusal of care in store material.

SECONDARY ERROR CODES

CODES	EXPLANATION
01	Material found on a location that was not loaded to the item locator file.
02	Material found in receipt warehouse holding area.
03	Material found in receipt holding area.
04	Material found at PP and P.
05	Material found at repair.
06	No material found. Use with complete stock denials when valid location is cited in DD 1348-1/481. Code A-06-/H-06-.
07	Material found but no ILF loaded. -no record found-.
08	Material found on the location indicated on the picking ticket/ZBI.
09	No material found on location indicated in the picking ticket/ZBI. Material found on other location that is loaded on ILF.
10	Partial quantity of material found on location not shown on picking ticket/ZBI.
11	Material improperly marked, i.e. transposed digits as a result of repacking or NSN change that is not recorded.
12	Picking ticket/ZBI produced with dummy or non-existant location. No material is found. Use code A-12-AZ/11-12-AZ.

13	Picking ticket produced with no location. No material is found. Use code A-13-AZ.
14	Material found on location but ILF record reflects erroneous quantity.
15	Deletion of erroneous ILF trailer.
16	Consolidation of material. Elimination of multiple location within same area.
17	No material found on location indicated on picking ticket/ZBI. Material found on other location that is not loaded on the ILF.
18	Picking ticket/ZBI produced with dummy or no location. Material found on location that is not loaded on the ILF.
19	Picking ticket/ZBI produced with dummy or no location. Material found on location that is loaded on the ILF.
20	A6 reject to ICP. No ILF record. Use A-20-7.
21	Insufficient quantity found on bin replenishment notice or care in store material.
22	Incorrect/incomplete ILF trailer loaded.
23	X5 did not process - use code F-23.
24	Shortage of shipment at traffic because of damage/pilferage. Use code D-24.

STUDENT COURSE CONTENT ASSISTANCE REQUEST MCI-CP19a

DATE:

COURSE NUMBER COURSE TITLE

NAME RANK MOS

SOCIAL SECURITY NUMBER

1. Use this form for any questions you may have about the course. Write out your question and refer to the study unit, work unit, or study question with which you are having problems. Complete the self-addressed block on the reverse side. Before mailing, fold the form and staple it so that MCI's address is showing. Additional sheets may be attached to this side of the form.

MY QUESTION IS: OUR ANSWER IS:

SIGNATURE (TITLE OR RANK)

STUDENT: Detach and retain this portion.

DATA REQUIRED BY THE PRIVACY ACT OF 1974
(5 U.S.C. 522A)

1. AUTHORITY: Title 5, USC, Sec. 301. Use of your Social Security Number is authorized by Executive Order 9397 of 22 Nov 43.

2. PRINCIPAL PURPOSE: The Student Course Content Assistance Request is used to transmit information concerning student participation in MCI courses.

3. ROUTINE USE: This information is used by MCI personnel to research student inquiries. In some cases information contained therein is used to update correspondence courses and individual student records maintained by the Marine Corps Institute.

4. MANDATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION: Disclosure is voluntary. Failure to provide information may result in the provision of incomplete service to your inquiry. Failure to provide your Social Security Number will delay the processing of your assistance request.

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ATTN: COURSE PREPARATION

DETACH BEFORE MAILING

STUDENT REQUEST/INQUIRY
MCI - R141

DATE SENT: _____
DATE RECEIVED AT MCI: _____

COURSE NUMBER	COURSE TITLE

COMPLETE ALL PORTIONS OF SECTION 1

Section 1. Student Identification

Rank	Initials	Last Name	MOS

SSN	REPORTING UNIT CODE (RUC)

MILITARY ADDRESS

ZIP CODE

INSTRUCTIONS: Print or type name, rank, and address clearly. Include ZIP CODE. Only Class III Reservists may use civilian address.

Section 2. CHECK THE APPROPRIATE BOX AND FILL IN THE APPROPRIATE SPACES.

FOR REGULAR AND CLASS II RESERVE MARINES THIS FORM MUST BE SIGNED BY THE COMMANDING OFFICER OR HIS REPRESENTATIVE, i.e. TRAINING NCO.

1. ☐ EXTENSION - Please grant an extension. (Will not be granted if already on extension.)

2. ☐ NOTICE OF COURSE COMPLETION - Final Exam Sent On _____. (New exam will be sent if exam not received at MCI.)

3. ☐ REENROLLMENT - Student has course materials (see page I-1 of MCI Catalog for eligibility for reenrollment.)

4. ☐ OVERDUE FINAL EXAM - Last (Review) lesson sent on _____. Please send exam.

5. ☐ Please send new ANSWER SHEETS.

6. ☐ Please send missing course materials (Not included in course package.)
Lessons ____ Manual ____ Other ____ _____

7. ☐ CHANGE - Rank _____ Name _____
Social Security Number ☐☐☐-☐☐-☐☐☐☐
RUC _____

8. ☐ OTHER (explain) _____

_____

Note: This form will not be returned by MCI. If request is valid, transaction will be on next CAR or on _____ form.

_____
SIGNATURE-TITLE OR RANK
(MUST BE CO OR REPRESENTATIVE)

FOR MCI USE ONLY

1. D____
2. On SMF ___ K ___ L ___
3. C____
4. L____
5. Q____
6. P____
7. E____
8. _____
_____
_____

DATE COMPLETED _____

ORIGINATOR CODE _____

Student: Detach and retain this portion.

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